Section 232 Investigation into Machine Tools

Report on Machine Tool Requirements During a Conventional Mobilization

Introduction

At the April 19,1983 meeting of the Interagency Working Group--Section 232 Machine Tool Investigation, the Federal Emergency Management Agency (FEMA) was assigned the following task: "Submit an analysis of the mobilization requirements. Base the requirements upon Department of Defense (DoD) expenditure patterns."

This report presents the findings, methodologies, data sources, and major assumptions used to carry out the assignment listed above.

On May 31,1983, a paper was submitted to Ms. Leslie J. Barr, Chairperson of the Interagency Working Group, that describes the methodology, data sources and assumptions that were proposed for use in carrying out the assigned task. As stated in the cover letter: "The purposes of the paper are threefold: (1) to make a matter of record the various understandings on methodology between our two agencies, (2) to list the information required from Commerce (on the inputs and investment neeeded [from] the machine tools industry), and (3) to obtain the endorsement of Commerce on the assumptions and data to be used for the analysis." On July 5,1983, Ms. Barr replied with a letter that confirmed the usage of the quantitative methodolgy outlined in the May 31,1983 paper. The May 31,1983 letter; the paper; and the July 5,1983 reply are attached as Appendix I of this report.

Based on the confirmation noted above, estimates of machine tool requirements are based on Scenario C-11- the "Stockpile War Scenario". The embodiment of the economic activities reflecting the narrative of this scenario are military expenditure and civilian consumption patterns for a baseline peacetime year and subsequent periods of the mobilization. For an unclassified narrative description of Scenario C-11, and a discussion of the major policy issues underlying industrial mobilization for this scenario, two papers by Douglas P. Scott of FEMA are attached to this report as Attachments I and II respectively: "Assumptions of the 1983 Stockpile War Scenario" and "FEMA Analysis of Policy Issues In the Industrial Mobilization Base Study of the National Defense Stockpile War Scenario".

Based on the July 5,1983 letter, the same expenditure and consumption data used for stockpile planning was used to determine mobilization requirements for machine tools. These data are exactly the same as that used for the Section 232 Investigation into nuts, bolts, and large screws. The source of these expenditure patterns is the natural resources division of

the Resources Preparedness Office of FEMA. The natural resources division conducts annual studies of the need for critical materials stockpiles in order to support a conventional mobilization. These studies are based on Scenario C-11; DoD submits expenditures required for the 50 DoD budget categories in order to sustain the mobilization described in the narrative of Scenario C-11. In addition, elaborate and sophisticated econometric studies are conducted in order to determine the profile of the civilian economy and what levels of civilian consumption might be anticipated because of the mobilization crisis.

Input-output economic analytical techniques are an integral part of the natural resources division's stockpile modelling procedures. Therefore, the DoD expenditure patterns ,described above, and the civilian consumption patterns derived from their econometric analyses are converted into a form amenable to input-output analysis; in effect, these are final demands for each industry's output, often referred to as a "bill of goods".The natural resources division compiles bills of goods for both the defense and civilian sectors of the economy. These bills of goods, based on Scenario C-11, are the basis for determining mobilization requirements for those goods under a Section 232 investigation.

Because machine tools are a capital good, the standard input-output approach of multiplying a bill of goods by a total requirements matrix to determine production requirements will not suffice. A capital input-output table is needed to determine each industry's additional requirements for plant and equipment during a mobilization emergency. The standard input-output table deals with intermediate transactions in goods and services used immediately for production, all capital goods are shown as output to final demand. A capital input-output table is a detailed expansion of these sales to final demand by industries purchasing capital goods and by those industries producing capital goods. These purchases are related to capacity and capital stocks to form a capital input-output table. With this table, changes in capital stock necessary to meet projected levels of output can be determined

Summary of Methodology and Assumptions

The final product from the application of the methodolgy is a series of tables listing changes in the capital stock requirements for metal cutting and metal forming machine tools, based on the final demand bills of goods for the stockpile war scenario. To compile these tables required the development of the mathematical procedures underlying the economic theory; the simplifying assumptions needed to bridge the gap between theory and implementation; and the acquisition and editing of relevant data to flesh out the mathematical procedures.

With minor modifications, the analytical procedures described in Appendix I have been followed, which describes a

refinement of standard input-output procedures: the use of a capital input-output table. A description of the derivation of a capital input-output table and its uses in determining new investment requirements may be found on pages 116 to 120 of "Input-Output Tables and Analysis", Studies in Methods Series F No. 14, Rev 1, published by the United Nations in New York in 1973.

The assumptions concerning the procedures and data are the same as those listed in Appendix I. The assumptions concerning the stockpile scenario are discussed in Attachments I and II.

The results of the computations indicate substantial shortfalls in the ability of the domestic machine tool industry to meet the mobilization requirements specified for this investigation. In the discussion of each factor, there is constant reference to increasing domestic machine tool production capacity. However, the only other alternative to the increase of domestic production capacity is the importation of machine tools rather than producing them domestically. The exercise of this alternative raises the question of import availability during the mobilization; this is beyond the purview of the tasks assigned to FEMA in the April 19th memo. The determination of import availability has been assigned to another agency.

Summary of Findings

As stated above, the final product of this study are a series of tables that show the incremental additions or reductions in the stocks of metal cutting and forming machine tools to expand mobilization mobilization production beyond 1980 capacities. Each of these tables list results for each of the 68 industrial categories used for the input-output analysis. In this section, only the totals of these tables are listed and interpreted. The detailed tables provide information on each of the 68 industrial categories. All dollar values are in millions of constant $1983.

Metal Cutting Machine Tools:

Table A. Changes in Stocks of Metal Cutting Machine Tools to Meet Production Goals During a Mobilization

Initial Stocks of Metal Cutting Machine Tools: $54,187.3
Estimated 1980 Production Capacity: $7,685.7

	Factor	Mob Yr.	Year 1	Year 2	Year 3
	Total U.S. Production:				
1	Required Additions to 1980 Stock($)	15,339.9	14,430.4	9,038.8	4,728.1
2	Metal Cutting Machine Tool Stock($)	69,527.2	83,957.6	92,996.4	97,724.5
3	% Change in 1980 Capacity	99.6%	87.8%	17.6%	-38.5%
4	% Change in Initial Stocks	28.3%	54.9%	71.6%	80.3%
	Maximum 20% Surge in Capacity:				
	% Change in Productivity- 15.27%				
5	% Change in Required Additions	-15.2%	-3.0%	2.1%	10.0%
	Maximum 40% Surge in Capacity:				
	% Change in Productivity- 30.47%				
6	% Change in Required Additions	-23.3%	-5.8%	2.2%	15.3%
	Defense Production:				
7	Required Additions to 1980 Stock($)	9,399.0	15,369.8	10,781.7	8,196.9
8	Metal Cutting Machine Tool Stock($)	63,586.3	78,956.1	89,737.8	97,934.7
9	% Changes in 1980 Capacity	22.3%	100.0%	40.3%	6.7%
10	% Change in Initial Stocks	17.3%	45.7%	65.6%	80.7%
11	% of Total Additions to 1980 Stock	61.3%	106.5%	119.3%	173.4%
	Production-Civilian Economy:				
12	% of Total Additions to 1980 Stock	38.7%	-6.5%	-19.3%	-73.4%

Table A contains the basic information to determine the ability of the domestic manufacturers of metal cutting machine tools to satisfy mobilization production requirements. There are 12 factors to be considered for this analysis; each one will be discussed in turn:

Factor 1 - Required Additions to 1980 Stock and
Factor 2 - Metal Cutting Machine Tool Stocks

Source-Factor 1: Bottom row of Table 1 in Appendix II, columns 2 to 5.
Source-Factor 2: Cumulative sum of Factor 1 plus $54,187.3 million

These values are the amounts of metal cutting machine tool stocks that must be added to existing stock levels as of 1980. Substantial increments of metal cutting machine tools are indicated. Starting with initial stocks of metal cutting machine tools of $54,187.3 in 1980, stocks in the mobilization year and the three succeeding war years must be $69,527.2, $83,957.6, $92,996.4, and $97,724.5 respectively. These are substantial increases over the four year period, and are based on significant increases in defense expenditures and civilian consumption over and above that which can be provided by production capacities in 1980.

Factor 3 - % Changes in 1980 Capacity

Source: Factor 1 of Table A divided by $7,865.3 million

Measured in constant $1983, the capacity to produce metal cutting machine tools in 1980 was $7.686 billion. To meet mobilization production requirements, the domestic capacity to produce these machine tools must be 99.6% greater than the level in 1980 before the mobilization year, this increase will suffice for the remaining three war years. These values indicate a severe lack of domestic capacity for a mobilization emergency and implies either a massive expansion of the domestic capacity to produce metal cutting machine tools, prior to the onset of a mobilization, or a very great reliance on the availability of imports during the mobilization and first war year, or some combination of the two.

Factor 4 - % Change in Initial Stocks:

Source: Factor 2 of Table A divided by $54,187.3 million

These values indicate that each mobilization period's additions of metal cutting machine tools is over and above the additions in the previous period. At the end of the four years covered by the mobilization scenario, stocks will have increased by 80.3% over the initial stock of $54,187.3.

Factor 5 - Maximum 20% Surge: % Change in Required Additions

Source: Bottom row of Table 2,Appendix II for "TOTAL U.S. PRODUCTION" divided by the same values listed in Table 1; Appendix II minus one times 100

This factor relates to the analysis of the assumption of a maximum 20% surge in capacity; the 1980 capacity estimates were increased by the maximum of 20% for those manufacturing industries operating at less than 140 hours a week. For those manufacturers operating at 140 hours or more a week, capacity was increased by less than 20% to reach a three-shift, seven day workweek.

The values for factor 5 indicate a 15.3% reduction in the need for metal cutting machine tools during the mobilization year and a reduction of 3% during the first war year. The increases indicated for the second and third war years of 2.1% and 10.0% are based on increased capacities across all manufacturers, not merely defense related industries. The increased demand shown for civilian as well as defense related industries generates increased requirements for metal cutting machine tools during the second and third war years. Limiting maximum 20% increases in metal cutting machine tools to only defense related manufacturers would result in lower requirements for metal cutting machine tools. However, there is no definitive list of defense related manufacturers and there have been no definitive studies verifying that any surges in production capacity are feasible.

Factor 6 - Maximum 40% Surge: % Change in Required Additions

Source: The same as Factor 5, substituting Table 3,Appendix II

The values listed here are greater because of a 40% surge rather than a 20% surge. Notice that the savings in machine tool requirements are not double the saving for a 20% surge. Except for relative magnitude, the comments regarding a 20% surge, listed for factor 4, also apply to a 40% surge.

Factors 7 to 11 refer to metal cutting machine tool requirements for defense production only. The comments on Factors 1 and 2 are essentially the same as for Factors 7 and 8; therefore, we proceed to comments on factors 9,10,11, and 12.

Factor 9 - Defense Production: % Change in 1980 Capacity

Source-Factor 7: Bottom row of Table 1 in Appendix II, columns 6 to 9.
Source-Factor 8: Cumulative sum of Factor 7 plus $54,187.3.
Source-Factor 9: Factor 7 of Table A divided by $7,865.7.

The value $7.686 billion refers to the estimated metal cutting machine tool production capacity for 1980. To meet requirements during the mobilization year, this industry's capacity must be increased by 22.3% over that for 1980. In order

to accomodate all increases in metal cutting machine tool stocks for defense production, the 1980 capacity to produce them must be increased by 100.0% by the beginning of the first war year. Before the beginning of the mobilization year, capacity must be expanded by 22.3%. If these capacity expansions take place, then the capacity expansions listed for war years 2 and 3 (40.3% and 6.7%) will not be necessary since both these percent values are less than 100%, the percent increase listed for the first war year.

Factor 10-Defense Production:% Change in Initial Stocks

Source-Factor 10: Factor 9 divided by $54,187.3.

The percent increases in metal cutting machine tools needed for only defense production remain significantly lower than those listed for Factor 4, for the entire economy, through the first and second war years. By the third war year, the required percent increase is about the same as for the entire economy (80.7% vs. 80.3%). A comparison of these values over the duration of the mobilization indicate that,except for the mobilization year, all increases in stocks were for defense production alone.

Factor 11-Defense Production:% of Total Additions to 1980 Stocks

Source-Factor 11: Factor 7 divided by Factor 1 times 100.

Keeping in mind that these percentages refer to changes in stocks of metal cutting machine tools, the increase in requirements for defense production is 61.3% of the total increase during the mobilization year and increases to 106.5%, 119.3%, and 173.4% for each of the succeeding years. Percentages greater than 100% indicate a reduction in the need for metal cutting machine tools for civilian production; thus, assuming fungibility, there must be significant shifts of metal cutting machine tools away from civilian to defense production. If fungibility is not possible, then further increases in capacity over 1980 levels must take place.

Factor 12-Production Civilian Economy: % of Total Additions to Stock

Source-Factor 12: Factor 7 minus Factor 1 divided by factor 1 times 100.

The negative percents for the war years of -6.5%, -19.3%, and -73.4% measure the required amount of overall fungibility of metal cutting machine tools necessary to satisfy total defense production requirements. Required fungibility varies for each industry. The negative values in the columns for civilian production in Table 1 indicate the level of fungibility needed for each of the 68 industries in the model developed for this investigation. However, assuming the worst case- complete lack of fungibility of metal cutting machine tools throughout the economy- the negative percents listed above indicate the

additional capacity additions needed over and above those listed for factor 3. Potential fungibility of metal cutting machine tools from civilian to defense production for each industry may be determined from either surveys or engineering analyses; the sum of potential fungibility of civilian and defense production within each industry will determine the actual need for additional capacity beyond those listed for factor 3.

Metal Forming Machine Tools:

Table B. Changes in Stocks of Metal Forming Machine Tools to Meet Production Goals During a Mobilization

Initial Stocks of Metal Forming Machine Tools: $22,040.1
Estimated 1980 Production Capacity: $3,413.2

	Factor	Mob Yr.	Year 1	Year 2	Year 3
	Total U.S. Production:				
1	Required Additions to 1980 Stock($)	4,886.9	4,083.6	1,968.6	983.2
2	Metal Forming Machine Tool Stock($)	26,927.1	31,010.6	32,979.3	33,962.4
3	% Change in 1980 Capacity	43.2%	19.6%	-42.3%	-71.2%
4	% Change in Initial Stock	22.2%	40.7%	49.6%	54.1%
	Maximum 20% Surge in Capacity:				
	% Change in Productivity- 13.91%				
5	% Change in Required Additions	-9.1%	-3.0%	8.0%	12.9%
	Maximum 40% Surge in Capacity:				
	% Change in Productivity- 27.82%				
6	% Change in Required Additions	-9.6%	-6.6%	8.8%	18.6%
	Defense Production:				
6	Required Additions to 1980 Stock($)	2,993.6	4,699.2	2,893.8	2,176.6
7	Metal Forming Machine Tool Stock($)	25,033.8	29,732.9	32,626.7	34,803.9
9	% Changes in 1980 Capacity	-12.2%	37.7%	-15.2%	-36.2%
10	% Change in Initial Stock	13.6%	34.9%	48.0%	57.9%
11	% of Total Additions to 1980 Stock	61.3%	115.1%	147.0%	221.4%
	Production-Civilian Economy:				
12	% of Total Additions to 1980 Stock	38.7%	-15.1%	-47.0%	-121.4%

Table B contains the same information for metal forming machine tools as Table A for metal cutting machine tools. The interpretation and analysis of the 12 Factors is virtually the same. The only differences are in degree. In comparison with additional capacity requirements for metal cutting machine tools, the metal forming types require additions of only 43.2%, compared to 99.6% for the metal cutting types. For defense production, maximum capacity expansion must be only 37.7% compared to 100% for metal cutting machine tools. Also, as with metal cutting machine tools, most of the additional requirements for metal forming machine tools is due to defense production requirements and not for civilian production.

The Bases For Estimating Machine Tool Requirements

The amount of machine tool requirements for a conventional

mobilization listed in Tables A and B above and the their supporting tables, are based upon levels of civilian consumption and defense expenditures for a conventional mobilization. Starting with these values, the estimates of machine tool requirements are ultimately determined by a series of computations using data and based on economic theories that reflect actual economic activities as closely as possible.

Virtually all studies dealing with the quantitative evaluation of industrial production fall back on the use of input-output economic analysis. This is because no other technique accounts for the transactions that encompass all economic activities. With an input-output based model, all of the transactions in the direct and indirect requirements for materials, semi-, and finished-goods and services may be taken into account. An input-output model is particularly appropriate for the analysis of mobilization requirements since the model reflects only the physical exchange of goods and services as measured in constant dollars. Thus the model measures feasible outcomes without extraneous financial and market factors, such as interest rates, money supply, price, demand and supply elasticities,etc. Thus, given defense and civilian requirements, the production levels needed to satisfy those requirements may be determined directly without the intrusion of the unecessary factors listed above. Financial and demand factors should be viewed as causes and not results; they might be used as instruments to assure the attainment of production requirements determined by input-output analysis.

For this Section 232 Investigation, an input-output model covering 68 industrial activities was compiled from an update to 1977 of the Bureau of Economic Analysis (BEA) benchmark table for 1972. Two of these 68 industries are machine tools-metal cutting (39) and metal forming (40). Table C includes a list of these 68 industrial activities.

With the 68 industry input-output model, the level of production of each of these 68 economic activities to meet mobilization goals may be determined. To do this requires estimates of civilian and military consumption of end-use goods and services; these goods and services are the termination of many interlocking chains of production. In other words, these goods and services are not used for the production of any other finished good and service. The sum of all this "final" consumption, referred to as "final demand", is gross national product (GNP), the standard measure of the wealth produced by an economy. In an input-output model, it is the final demand for the output of each industrial activity that determines the production required from each industry to satisfy the entire mix of final demand. For example, there might not be much final demand for steel mill products, but, in comparison, there is much final demand for motor vehicles. In an input-output model, final demand for motor vehicles generates intermediate demand for steel by the motor vehicle industry. Another example is final demand for aircraft implies intermediate demand for primary aluminum, since so much aluminum is needed to produce an aircraft, etc.

It may be seen that an input-output model may be used to simulate the production needed from each industrial activity by using estimates of final demand for each industry that reflects an economy that is being mobilized.

In the absence of any other estimates, the final demand estimates used by the natural resources division of the resource preparedeness office of FEMA has been used for this study; the scenario underlying the values is often referred to as the "stockpile scenario" or "Scenario C-11". The details of this scenario are classified, and will not be discussed in this report. For this study, the narrative of the scenario is meaningless because only the final demand estimates based on this scenario is the actual determinant of production requirements. The mobilization final demand is split into two categories: civilian consumption and defense expenditures. The columns of values (vectors) for these two classes of final demand reflect the proposed levels of civilian consumption during the mobilization and the requirements for military materiel in order to meet the objectives described in the narrative of the scenario. The level and mix of both civilian consumption and military requirements determine production requirements by each industrial category, which, in turn, determines the requirements for additional capital goods, in this case, machine tools.

Tables C and D have been prepared to show the changes in final demand and production in order to simulate economic activities during Scenario C-11. The first column of Table C lists the maximum feasible final demand based on capacity estimates for 1980; these values include both civilian consumption and military expenditures. These values are based upon the assumption that each industrial category is producing at 100% of its capacity; therefore, these final demands are somewhat distorted from actual 1980 final demand for each industrial category. As will be shown, the estimates of machine tool requirements are based on changes in final demand from one period to another. The final demand in the first column of Table C are the basis for determining increases or decreases in final demand during the ensuing mobilization. The use of these values as a baseline tend to reduce the changes in final demand that is the basis for estimating machine tool requirements. In other words, capacity is taken into account as a mitigating factor in the estimation of machine tools needed for mobilization. The entries in columns 2 through 10 are changes in final demand from the previous period for civilian consumption and DoD expenditures. These values were compiled as follows:

Total final demand (civilian plus military) for the mobilization (MOB) year was compared to maximum feasible final demand (listed under the column labelled "1980 MAXGNP" in Table C).If the value in column 1 is lower than the MOB final demand value, then the difference is taken and entered in the "MOB YR" column; if higher, the value entered is zero. Similarly, the final demand for years 1, 2, and 3 each were compared to 1980 MAXGNP and, if lower, the change in final demand is zero,

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TABLE C: CHANGES IN CIVILIAN CONSUMPTION AND DOD EXPENDITURES
DURING A CONVENTIONAL MOBILIZATION
(BILLIONS $1972)

SEQ	INDUSTRY NAME	1980 MAXGNP	CHANGES:CIVILIAN CONSUMPTION MOB YR	YEAR 1	YEAR 2	YEAR 3	DODEXP 1982	CHANGES:DOD EXPENDITURES MOB YR	YEAR 1	YEAR 2	YEAR 3
1	AGRICULTURE	9.9	11.2	-1.4	0.7	-0.9	0.0	0.0	0.0	0.0	0.1
2	IRN&FRRALLYS MIN.	-2.0	1.5	0.1	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0
3	NFRRS MTL ORES MIN	-0.3	0.3	0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
4	COAL MINING	3.4	0.0	0.0	0.0	-0.1	0.1	0.0	0.0	0.0	0.1
5	CRUDE PET & NAT GA	-14.2	10.5	-0.5	-0.6	-0.2	0.0	0.0	0.0	0.0	0.0
6	STONE,CLAY MIN,ETC	-0.7	0.3	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.0
7	CHM,FRTLZR MINRALS	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	CONSTRUCTION	148.2	-1.5	-3.8	-1.9	-2.1	4.1	1.5	3.8	1.9	2.1
9	ORDNANCE & ACCESS.	24.4	0.0	0.0	0.0	0.0	7.8	12.5	55.1	36.4	21.6
10	FOOD,KINDRED PRD.	107.5	0.0	-0.2	0.1	0.0	0.0	0.0	0.2	-0.1	0.0
11	TOBACCO MFRS.	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	FABRCS,YARN,THREAD	-0.1	1.9	-0.2	-0.4	-0.1	0.1	0.0	0.0	0.0	0.0
13	MSC TXTLS,FLR COV	5.6	-0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
14	APPAREL	37.1	-0.1	-0.1	0.0	-0.1	0.3	0.1	0.1	0.0	0.1
15	OTH MSC TXTL PRD	4.8	-0.2	-0.3	-0.1	-0.2	0.3	0.2	0.3	0.0	0.2
16	LUMBER,WOOD PRD.	6.2	-0.1	-0.1	0.0	-0.1	0.0	0.1	0.1	0.0	0.1
17	WOODEN CONTAINERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
18	FURNTR & FIXTRS	21.3	-0.1	-0.1	0.0	-0.1	0.1	0.1	0.1	0.0	0.1
19	PAPER,ALLIED PRD.	2.3	0.6	0.3	-0.4	-0.5	0.1	0.0	0.1	0.0	0.1
20	PPRBRD CNTNRS,BOXE	0.8	0.0	0.0	-0.1	-0.1	0.0	0.0	0.1	-0.1	0.0
21	PRINTING,PUBLISHIN	11.8	-0.1	-0.1	-0.1	-0.1	0.4	0.1	0.1	0.1	0.1
22	CHEM. & ALLIED PRD	2.0	3.1	-0.4	-1.2	-0.9	0.8	3.6	7.8	5.9	3.3
23	PLASTICS,SYN.MTRLS	0.9	0.5	-0.1	-0.2	-0.2	0.1	0.0	0.2	0.1	0.1
24	DRUGS,CLEANNG,ETC.	30.5	-0.1	-0.2	0.1	-0.1	0.2	0.1	0.2	-0.1	0.1
25	PAINTS,ALLIED PRD.	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	PETRO. REFINING	14.7	-0.1	-0.2	-0.3	-0.4	1.1	0.1	0.2	0.3	0.4
27	RUBBER,MSC.PLSTCS	5.3	0.7	-0.2	-1.0	-0.6	0.4	0.4	0.5	0.2	0.3
28	LEATHER TANNING	-0.1	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
29	FOOTWEAR,OTH. PRD.	5.9	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
30	GLASS & PRODUCTS	1.7	0.0	-0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
31	STONE & CLAY PRD.	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	PRIM. IRON&STEEL	-13.2	10.6	0.9	-0.9	-0.8	0.2	2.3	1.8	0.9	0.8
33	PRIM. NFRRS MTLS.	-2.0	0.0	0.8	-0.8	-0.8	0.2	1.4	2.1	1.1	0.8
34	FBRCTD. MTL. PRD.	14.2	-1.6	-1.5	-0.9	-0.6	0.6	1.6	1.5	0.9	0.6
35	ENGINES&TURBINES	5.4	-0.6	0.0	-0.3	-0.4	0.4	0.5	0.5	0.3	0.3
36	FARM MACH.,EQUIP.	11.8	-0.1	0.0	-0.1	0.0	0.0	0.1	0.0	0.1	0.0
37	CNSTCTN,MIN,OIL EQ	11.6	3.3	-0.1	-0.2	-1.3	0.1	0.4	0.7	0.3	0.2
38	MTRL HNDLNG,SP.IND	13.1	0.4	0.4	-0.3	-1.5	0.1	0.4	0.5	0.4	0.2
39	MACH.TOOLS-CUTTING	2.0	0.9	0.2	-0.1	-0.3	0.0	0.1	0.1	0.1	0.0
40	MACH.TOOLS-FORMING	0.8	0.8	0.4	0.1	-0.1	0.0	0.0	0.1	0.0	0.0
41	SP.DIES,TOOLS,ETC.	2.2	2.9	0.4	0.1	-0.4	0.0	0.2	0.1	0.1	0.0
42	MTL.MACH-POWER TLS	3.7	-0.1	-0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0
43	GEN. MACH,SHOP PRD	9.8	-1.0	-0.5	-0.2	-0.9	0.3	1.0	1.0	0.6	0.4
44	COMPUTERS, ETC.	20.9	8.7	0.1	-0.4	-2.9	0.1	0.9	1.2	0.6	0.6
45	SERVICE IND. MACH.	6.6	-0.1	0.1	-0.2	-0.3	0.1	0.2	0.1	0.1	0.1
46	ELEC. TRNSMSSN EQ.	8.9	2.4	0.4	-0.2	-1.2	0.5	1.7	1.9	1.1	0.8
47	OTH ELEC. EQ.	17.2	1.1	-1.9	-3.5	-2.0	1.0	2.5	2.6	1.1	1.0
48	COMMUNICATION EQ.	23.5	10.1	-6.3	-4.0	-2.6	6.3	21.2	30.8	12.1	10.9
49	MOTOR VEHICLES	91.6	-2.6	-6.3	-4.9	-2.6	1.2	2.6	6.3	1.9	2.2
50	AIRCRAFT	22.2	4.0	0.3	-0.8	-1.9	12.1	18.2	31.3	28.5	23.2
51	SHIPS & BOATS	9.0	-3.5	0.2	0.1	-0.3	2.9	14.2	10.7	5.5	3.6
52	RAILROAD EQUIP.	3.4	0.9	0.2	0.1	-0.4	0.0	0.0	0.0	0.0	0.0
53	OTHR. TRNSPTTN EQ.	5.4	2.3	-0.3	-0.4	-0.1	0.0	0.1	0.2	0.1	0.1
54	INSTRMNTS,OPTCL GD	18.1	5.0	-1.0	-1.1	-1.4	1.1	2.5	3.5	2.2	1.6
55	MISC. MFG.	15.4	-0.2	-0.2	-0.1	-0.1	0.1	0.2	0.2	0.1	0.1
56	TRANSPORTATION	34.9	-3.9	-2.4	-1.0	-2.0	3.5	8.4	17.9	12.8	8.0
57	COMMUNICATIONS	27.1	5.4	-0.3	-0.4	-2.1	1.1	0.9	2.0	1.6	1.2
58	RADIO,TV BRDCSTNG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	PUBLIC UTILITIES	34.6	-0.3	-0.3	-0.2	-0.4	0.8	0.3	0.3	0.2	0.4
60	TRADE	249.4	32.4	-15.4	-11.0	-14.4	2.2	2.1	3.5	2.2	1.8
61	FINANCE,INSURNCE	61.1	0.0	0.0	1.4	1.8	0.0	0.0	0.0	0.0	0.0
62	REAL ESTATE,RENTLS	179.9	0.0	-0.1	0.0	0.0	0.2	0.0	0.1	0.0	0.0
63	HOTELS,PERS REPRS	23.3	-0.5	-1.5	1.0	0.1	0.7	1.9	3.3	2.2	1.4
64	BUSNESS SRVCS,R&D	12.2	4.4	-1.2	0.4	-0.2	1.8	5.6	7.0	5.2	3.8
65	AUTO REPAIRS	19.0	5.2	7.5	3.2	2.3	0.2	0.0	0.1	0.0	0.1
66	AMUSEMENTS	12.4	1.5	-1.6	-0.1	-0.2	0.4	0.1	0.0	0.1	0.2
67	MED,EDUC,NONPROFIT	103.2	9.2	-10.3	5.1	-5.6	0.9	1.0	0.6	0.2	0.6
68	MISC. ECON. SECTOR	182.7	-3.1	-9.5	-16.5	-10.5	37.6	3.1	9.5	16.5	10.5
	COLUMN TOTALS	1683.7	122.2	-50.3	-40.1	-62.5	92.6	114.8	211.8	143.8	104.1

SECTION 232 INVESTIGATION INTO MACHINE TOOLS
TABLE D:CHANGES IN CIVILIAN AND DOD PRODUCTION
DURING A CONVENTIONAL MOBILIZATION
(BILLIONS $1972)

SEQ	INDUSTRY NAME	CHANGES:CIVILIAN PRODUCTION				CHANGES:DOD PRODUCTION				MTLCUT
		MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	COEF
1	AGRICULTURE	18.3	-3.4	0.4	-2.2	1.1	1.8	1.1	0.8	0.00207
2	IRN&FRRALLYS MIN.	2.3	0.0	-0.3	-0.3	0.4	0.6	0.3	0.2	0.01198
3	NFRRS MTL ORES MIN	0.6	0.1	-0.3	-0.4	0.8	1.2	0.7	0.5	0.00109
4	COAL MINING	1.1	-0.3	-0.3	-0.5	0.9	1.4	0.9	0.7	0.00083
5	CRUDE PET & NAT GA	13.1	-1.5	-1.5	-1.4	2.4	4.1	2.8	2.0	0.00002
6	STONE,CLAY MIN,ETC	0.5	-0.2	-0.3	-0.2	0.3	0.4	0.3	0.2	0.00110
7	CHM,FRTLZR MINRALS	0.2	0.0	0.0	0.0	0.2	0.3	0.2	0.1	0.00189
8	CONSTRUCTION	1.7	-4.9	-2.6	-1.3	3.8	7.7	4.6	4.0	0.00057
9	ORDNANCE & ACCESS.	0.0	0.0	0.4	0.2	13.3	59.9	38.9	23.1	0.00714
10	FOOD,KINDRED PRD.	4.4	-1.9	-0.6	-1.6	1.2	2.0	1.0	0.9	0.00039
11	TOBACCO MFRS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00018
12	FABRCS,YARN,THREAD	3.1	-0.8	-0.8	-0.7	0.7	1.1	0.7	0.6	0.00051
13	MSC TXTLS,FLR COV	0.1	-0.2	-0.1	-0.2	0.5	0.6	0.3	0.3	0.00033
14	APPAREL	0.1	-0.2	-0.1	-0.2	0.3	0.5	0.3	0.3	0.00019
15	OTH MSC TXTL PRD	-0.1	-0.5	-0.2	-0.3	0.4	0.8	0.4	0.4	0.00035
16	LUMBER,WOOD PRD.	0.7	-0.8	-0.8	-0.8	1.9	2.7	1.6	1.2	0.00216
17	WOODEN CONTAINERS	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.00292
18	FURNTR & FIXTRS	0.0	-0.2	-0.1	-0.2	0.7	0.9	0.4	0.4	0.00314
19	PAPER,ALLIED PRD.	2.2	-0.2	-1.0	-1.3	1.5	2.3	1.5	1.1	0.00197
20	PPRBRD CNTNRS,BOXE	0.6	-0.3	-0.3	-0.4	0.7	1.1	0.6	0.5	0.00166
21	PRINTING,PUBLISHIN	2.4	-1.1	-0.4	-1.0	3.0	4.5	3.0	2.3	0.00046
22	CHEM. & ALLIED PRD	7.4	-1.6	-2.5	-2.4	7.1	13.9	9.9	6.0	0.00260
23	PLASTICS,SYN.MTRLS	1.5	-0.5	-0.8	-0.7	1.4	2.0	1.2	0.9	0.00078
24	DRUGS,CLEANNG,ETC.	0.3	-0.5	-0.1	-0.3	0.2	0.5	0.1	0.2	0.00035
25	PAINTS,ALLIED PRD.	0.1	-0.1	-0.1	-0.2	0.5	0.6	0.4	0.3	0.00021
26	PETRO. REFINING	2.5	-1.2	-1.1	-1.5	3.0	5.3	3.7	2.6	0.00036
27	RUBBER,MSC.PLSTCS	2.5	-1.0	-1.7	-1.7	2.4	3.7	2.1	1.7	0.00393
28	LEATHER TANNING	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00053
29	FOOTWEAR,OTH. PRD.	0.0	-0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.00051
30	GLASS & PRODUCTS	0.3	-0.1	-0.2	-0.2	0.6	0.7	0.4	0.3	0.00235
31	STONE & CLAY PRD.	0.6	-0.5	-0.4	-0.5	0.9	1.5	0.9	0.7	0.00264
32	PRIM. IRON&STEEL	17.5	-0.7	-3.1	-4.0	10.8	13.9	7.9	5.7	0.01273
33	PRIM. NFRRS MTLS.	3.0	0.3	-3.4	-3.9	10.9	17.0	10.4	7.6	0.00666
34	FBRCTD. MTL. PRD.	1.1	-3.2	-2.4	-2.6	7.0	9.8	5.6	4.3	0.02472
35	ENGINES&TURBINES	-0.4	-0.1	-0.3	-0.8	1.8	1.8	1.0	0.8	0.01208
36	FARM MACH.,EQUIP.	0.1	-0.2	-0.1	-0.1	0.1	0.2	0.1	0.1	0.02389
37	CNSTCTN,MIN,OIL EQ	3.7	-0.2	-0.2	-1.6	0.7	1.0	0.5	0.4	0.03838
38	MTRL HNDLNG,SP.IND	0.5	0.3	-0.3	-1.7	0.7	1.0	0.6	0.4	0.03681
39	MACH.TOOLS-CUTTING	1.0	0.2	0.0	-0.4	0.1	0.2	0.1	0.1	0.12973
40	MACH.TOOLS-FORMING	0.8	0.0	0.1	-0.1	0.1	0.1	0.0	0.0	0.12765
41	SP.DIES,TOOLS,ETC.	3.5	0.3	0.1	-0.8	0.9	1.4	0.9	0.7	0.10503
42	MTL.MACH-POWER TLS	0.0	0.0	-0.1	-0.1	0.1	0.1	0.1	0.1	0.06119
43	GEN. MACH,SHOP PRD	1.0	-0.9	-0.6	-2.1	4.5	6.2	4.0	3.0	0.06021
44	COMPUTERS, ETC.	10.2	0.1	-0.5	-0.4	1.2	1.6	0.9	0.8	0.00686
45	SERVICE IND. MACH.	0.3	0.1	-0.1	-0.3	0.5	0.8	0.4	0.3	0.01420
46	ELEC. TRNSMSSN EQ.	3.9	0.2	-0.5	-2.1	3.3	4.0	2.3	1.8	0.02017
47	OTH ELEC. EQ.	4.7	-2.4	-4.8	-3.7	9.2	13.1	6.4	5.4	0.01896
48	COMMUNICATION EQ.	11.4	-0.4	-3.3	-3.2	25.3	37.1	16.0	14.1	0.01080
49	MOTOR VEHICLES	-1.1	-6.2	-1.9	-2.4	4.3	9.8	3.5	3.5	0.01107
50	AIRCRAFT	3.7	1.0	-1.0	-2.5	24.8	43.5	38.3	30.4	0.04137
51	SHIPS & BOATS	-3.6	0.1	0.2	-0.3	14.5	11.0	5.6	3.7	0.01265
52	RAILROAD EQUIP.	1.2	0.2	0.2	-0.5	0.1	0.1	0.1	0.1	0.01554
53	OTHR. TRNSPTTN EQ.	2.4	-0.3	-2.5	-0.1	0.2	0.3	0.1	0.1	0.00405
54	INSTRMNTS,OPTCL GD	5.8	-1.4	-0.2	-0.9	3.7	5.4	3.5	2.6	0.02041
55	MISC. MFG.	0.1	-0.5	-0.2	-0.3	0.5	0.8	0.5	0.4	0.00929
56	TRANSPORTATION	1.2	-4.5	-2.8	-4.8	15.1	29.2	20.2	13.2	0.00183
57	COMMUNICATIONS	7.4	-1.1	-0.8	-0.9	3.1	5.4	3.9	2.7	0.00009
58	RADIO,TV BRDCSTNG	0.6	-0.2	-0.0	-0.2	0.6	1.0	0.6	0.5	0.00013
59	PUBLIC UTILITIES	5.4	-2.1	-1.9	-3.0	5.9	9.0	5.9	4.4	0.00115
60	TRADE	40.7	-18.3	-13.2	-18.5	12.4	19.9	12.5	9.4	0.00041
61	FINANCE,INSURNCE	2.6	-1.1	-1.3	-1.0	2.4	3.9	2.5	1.8	0.00007
62	REAL ESTATE,RENTLS	9.4	-2.6	-1.1	-2.7	4.5	7.2	4.6	3.4	0.00001
63	HOTELS,PERS REPRS	0.6	-1.9	0.9	-0.5	3.2	5.4	3.4	2.5	0.00218
64	BUSNESS SRVCS,R&D	13.1	-5.0	-1.4	-4.3	16.1	24.2	16.0	11.7	0.00053
65	AUTO REPAIRS	6.3	6.9	2.8	2.0	1.2	2.1	1.3	1.0	0.00421
66	AMUSEMENTS	2.1	-2.1	-0.2	-0.3	0.4	0.6	0.5	0.4	0.00114
67	MED,EDUC,NONPROFIT	9.7	-10.5	-5.0	-5.7	1.3	1.1	0.6	0.8	0.00030
68	MISC. ECON. SECTOR	-0.3	-10.4	-17.4	-12.0	6.7	15.2	20.1	13.1	0.00819
	COLUMN TOTALS	236.2	-88.6	-69.4	-115.5	248.5	426.8	279.3	203.7	

otherwise the difference in final demand for each of the time period minus the final demand in the previous period.

The same procedure was applied to compute changes in DoD final demand. The only difference is that the baseline values are the 1982 DoD expenditures rather than maximum feasible final demand. Thus, the increases in DoD expenditures during the mobilization periods are fully taken into account to determine machine tool requirements for defense production. Changes in civilian final demand (civilian consumption) is the difference between changes in total final demand and changes in DoD expenditures.

There is the implied assumption that during the mobilization there will be no retirements of existing capital goods regardless of their age and condition. Thus, in the estimation of machine tool requirements, it is assumed that machine tools in current use will continue to be used as well as the addtional machine tools needed.

As stated before, the entries in Table C are the determinants of machine tool requirements. Looking at the totals for columns 2 through 10, it is obvious that, except for the MOB YR, the additional requirements for machine tools are due to the changes in DoD expenditures. These changes are concentrated in the ordnance, communications, aircraft, and ships industrial categories.

The values in Table C are the starting point; with these values multiplied by the total requirements table, which contain factors that compute production based on final demand,production for DoD and Civilian end use are determined. Changes in production levels for each industry are listed in Table D, columns 1 through 8. Because of the final demand changes listed in Table C, considerable increases in defense production are shown, and, except for the MOB YR, there are reductions in civilian production.

The last column in Table D, labelled "MTLCUT COEF" are the investment coefficients for metal cutting machine tools. For example, the value .00207 for agriculture in row 1 column 9, indicates that for every billion dollars of change in agricultural production, the need by agriculture for metal cutting machine tools will change by $2.07 million as measured in constant $1972. Putting it another way, a billion dollar change in agricultural production will change metal cutting machine tool requirements by two-tenths of a percent.

The machine tool requirements listed for metal cutting machine tools in Table 1 of Appendix II can be reproduced using the information listed in Table D. These values are simply the result of multiplying each of the first eight columns in Table D by the coefficients listed in column 9. The MTLCUT COEF listed in column 9 are the values for row 39, metal cutting machine tools, in the capital input-output table compiled for this investigation.

A capital input-output table contains coefficients that relate the requirements for each capital item, such as plant, industrial machinery, and machine tools, to each industry's capital stock and capacity or output. A capital input-output table multiplied by output (production) will yield the levels of capital stock needed by each industry to support these levels of output. Increases in output generate the need for increases in capital stock, or investment; alternatively, decreases in output indicate potential amounts of disinvestment that can be sustained.

The following data is needed to calculate a capital input-output table: 1) the flows of investment from producer to purchaser; 2) capital stock holdings by each industry; and 3) estimates of capacity for each industry. The data for items 1) and 2) were available from the Bureau of Industrial Economics (BIE), specifically from Ken Rogers who has compiled data on investment and capital stock by industry from 1947 until 1980.

The Impact on Machine Tool Requirements of Zero Personal Consumption Expenditures (PCE)

In the preceding section, it was stated that changes in final demand determines the need for additional stocks of machine tools. Also, it was shown that final demand may be divided into two distinct parts: defense procurements and civilian consumption. If the final demand for either one or both these components of final demand were to be decreased, so would the requirements for additional machine tools be decreased.

The remarks in the section on the summary of findings for Factors 11, 12, and 13 indicate that, except for the mobilization year, all of the increases in the requirements for metal cutting machine tools are based on massive increases in defense final demand. It was also demonstrated that without the fungibility of metal cutting machine tools from civilian to defense production, the requirements for addition metal cutting machine tools would be even greater than those indicated.

It has been suggested that further reductions in civilian final demand during a mobilization would significantly reduce the requirements for additional machine tools. Or, conversely, the civilian consumption levels posited for the conventional mobilization are much too high. To demonstrate the efficacy of further reductions in civilian consumption to mitigate the need for additional machine tools, an experiment was devised where the computations using the original final demand was repeated for final demand values with personal consumption expenditures (PCE) reduced to zero. The results of these computations were compared to the values in Table A above, and are listed in Table E below:

Table E. Comparison of Factors 1 to 4 in Table A With Results Based on Zero PCE

Total U.S. Production
(Millions $1983)

Factor	Mob Yr.	Year 1	Year 2	Year 3
1 Required Additions to 1980 Stocks($):				
Mobilization (Table A)	15,339.9	14,430.4	9,038.8	4,778.1
Based on Zero PCE	12,798.6	14,087.7	9,242.9	4,957.2
% Change from Table A	-16.6%	-2.4%	2.3%	4.8%
2 Metal Cutting Machine Tool Stocks($):				
Mobilization (Table A)	59,527.2	83,957.6	92,996.4	97,724.5
Zero PCE	66,985.9	81,075.6	90,318.5	95,046.6
% Change from Table A	-3.7%	-3.4%	-2.9%	-2.7%
3 % Change in 1980 Capacity:				
Mobilization (Table A)	99.6%	87.8%	17.6%	-38.5%
Zero PCE	66.5%	83.3%	20.3%	-35.5%
% Reduction in Capacity Expansion: (83.3%/99.6%-1 x 100)=-16.4%				
4 % Change in Initial Stocks:				
Mobilization (Table A)	28.3%	54.9%	71.6%	80.3%
Zero PCE	23.6%	49.6%	66.7%	75.4%

A quick perusal of Table E indicates that, except for the mobilization year, no significant decreases in metal cutting machine tools are possible even with zero PCE. And, even for the mobilization year, requirements based on zero PCE are significantly above the 1980 metal cutting machine tool capacity estimate. The comparison of Factor 1 shows a decline in requirements during the mobilization year of only -16.6%. For Factor 2, the reductions in metal cutting machine tool stocks is less than 4% for all time periods. For Factor 3, the reduction in capacity expansion from 99.6% to 83.3% is only a -16.4% decrease. (This is a comparison of the largest value across both rows.) A comparison of Fator 4 shows that zero PCE would yield a reduction of less than 5 percentage points in the % change in capital stocks needed to support the mobilization.

The outlandish proposition of zero PCE was purposely selected to dramatize the fact that it is defense expenditures that generate the lion's share of increased metal cutting machine tools requirements; a similar analysis of metal forming machine tools would yield essentially the same results. No one can take seriously the idea of a civilian population during wartime, and immediately before, reduced to a zero subsistence level. Yet, the analysis shows that even if this should occur, the effect on machine tool requirements would not reduce significantly the need for additional machine tool capacity or a great reliance on imports. It is the defense requirements that are generating virtually all of need for additional machine tools well above domestic production capacity.

Major Requirements for Machine Tools by Industry

By a substantial margin, the aircraft industry will require the largest amount of additional metal cutting machine tools during the conventional mobilization for this investigation. Almost all of these machine tools are for defense production. Similarly, the same applies to the communications equipment industry for metal forming machine tools, however, much fewer of these machine tools are needed compared to metal cutting machine tools.

Those industries that have major requirements for additional machine tools have been extracted from Tables 1 and 4 in Appendix II and are listed in Table F and G; the industries are listed in descending order based upon requirements during the mobilization year (the stipulated period of warning).

The bottom row of each of these tables, labelled "PERCENT: TOTAL ECONOMY", indicates the amount of total machine tool requirements accounted for by the major users. These numbers show the change in the demand pattern for machine tools as the economy converts from peace to war. For example, in the bottom row, first column of Table F, the percent to total holdings of initial stocks of metal cutting machine tools by the thirteen major wartime users is 55.28%. Yet, during the mobilization, the additional requirements by these major users rises to 83.79% during the mobilization year and continues to rise to 89.15%, 92.05%, and 99.92% during the years of conflict. It is obvious that there is strong shift in demand toward those industries that produce weapons systems, such as aircraft; ships and boats; communications equipment; and instruments, as well as basic industries that are crucial lower tiered industries producing components and raw materials for these weapons systems.

The final three percentages listed in the bottom row of Table F-42.57%, 55.83$, and 69.25% indicate that there is less fungibility required of these major user industries. Most of these industries require new metal cutting machine tools with less potential for fungibility of existing stocks for defense rather than civilian production.

Similar remarks also apply to the demand for metal forming machine tools, as indicated by the bottom row percentages listed in Table G. The demand mix does not change as much from peace to war as indicated by the percentage of 74.57% in the first column of the bottom row rising to 85.68% during the mobilization year; this increase is not as great as shown in Table E. Also, much greater fungibility of existing stocks is indicated by the last three percentages of 86.85%, 92.86%, and 87.13%.

The order of the industries listed in both tables is different but most of the same industries may be found listed in both tables..

Appendix II contains the supporting tables that list

SECTION 232 INVESTIGATION INTO MACHINE TOOLS
TABLE F: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION
ESTIMATES ARE BASED ON NO SURGE IN 1980 CAPACITY LEVELS
(MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
50	AIRCRAFT	3947.6	3709.8	5792.7	4860.6	3637.1	3225.9	5663.1	4983.6	3956.1	483.9	129.6	-123.0	-319.0
41	SP.DIES,TOOLS,ETC.	1948.3	1469.5	566.3	328.8	-35.5	309.3	483.5	305.5	223.1	1160.2	82.7	23.3	-258.6
48	COMMUNICATION EQ.	1023.4	1247.1	1247.4	430.7	370.3	857.9	1259.7	543.0	477.6	389.2	-12.3	-112.3	-107.3
32	PRIM. IRON&STEEL	1990.5	1133.2	526.6	194.1	67.6	432.6	555.6	315.9	229.3	700.6	-28.9	-121.8	-161.7
43	GEN. MACH,SHOP PRD	5689.9	1037.2	1010.8	636.8	169.3	852.9	1179.1	765.7	561.9	184.4	-168.3	-129.0	-392.6
47	OTH ELEC. EQ.	2435.9	828.3	637.1	97.5	100.0	545.8	783.7	378.8	319.6	282.5	-146.6	-281.3	-219.6
34	FBRCTD. MTL. PRD.	6196.0	632.7	515.3	247.9	131.8	544.6	765.1	432.3	335.7	88.1	-249.8	-184.4	-203.
58	INSTRMNTS,OPTCL GD	1702.6	611.3	259.2	210.8	-84.9	237.2	346.1	225.9	167.7	374.1	-86.8	-15.1	-252.
37	CNSTCTN,MIN,OIL EQ	1742.9	536.7	101.0	33.3	-146.0	79.0	115.1	57.9	44.0	457.7	-14.2	-24.5	-190.0
39	MACH.TOOLS-CUTTING	997.0	457.7	151.0	52.9	-116.7	60.4	78.7	41.8	33.0	397.3	72.4	11.0	-149.7
46	ELEC. TRNSMSSN EQ.	1274.4	457.4	269.0	115.8	-18.2	209.5	252.0	143.8	111.4	247.9	17.0	-28.0	-129.6
51	SHIPS & BOATS	414.0	433.2	443.6	229.0	134.6	575.4	436.4	224.3	147.2	-142.2	7.2	4.7	-12.6
9	ORDNANCE & ACCESS.	591.4	299.8	1345.2	882.1	515.0	258.9	1347.1	874.9	520.0	40.9	-1.9	7.2	-5.0
STOCKS AND NET CHANGES		54187.3	15339.9	14430.4	9038.8	4728.1	9399.0	15369.8	10781.7	8196.9	5940.9	-939.4	-1742.9	-3468.8
PERCENT: TOTAL ECONOMY		55.28	83.79	89.15	92.05	99.92	87.13	86.31	86.20	86.94	78.52	42.57	55.83	69.25

SECTION 232 INVESTIGATION INTO MACHINE TOOLS
TABLE G: CHANGES IN STOCKS OF METAL FORMING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION
ESTIMATES ARE BASED ON NO SURGE IN 1980 CAPACITY LEVELS
(MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
48	COMMUNICATION EQ.	655.8	799.1	799.1	276.0	237.2	549.6	807.0	348.0	305.8	249.4	-8.0	-72.0	-68.7
32	PRIM. IRON&STEEL	1207.1	687.0	319.4	117.8	41.1	262.4	336.7	191.4	139.0	424.6	-17.2	-73.6	-97.9
34	FBRCTD. MTL. PRD.	6054.5	618.3	503.5	242.1	128.7	532.4	747.7	422.6	328.1	85.9	-244.1	-180.4	-199.4
47	OTH ELEC. EQ.	1547.7	526.4	404.7	62.0	63.7	347.0	497.9	240.8	203.0	179.4	-93.2	-178.8	-139.3
50	AIRCRAFT	300.9	282.6	441.5	370.5	277.3	245.8	431.5	379.8	301.5	36.8	10.0	-9.3	-24.2
46	ELEC. TRNSMSSN EQ.	722.4	259.4	152.3	65.7	-10.3	118.7	142.6	81.6	63.0	140.6	9.6	-15.9	-73.3
41	SP.DIES,TOOLS,ETC.	264.4	199.4	77.0	44.4	-5.0	42.1	65.7	41.5	30.2	157.2	11.3	3.0	-35.2
58	INSTRMNTS,OPTCL GD	456.8	163.9	69.7	56.7	-22.9	63.7	92.9	60.7	45.1	100.2	-23.2	-4.0	-68.0
33	PRIM. NFRRS MTLS.	464.0	160.9	200.3	80.9	43.5	126.4	197.4	120.1	87.6	34.5	3.0	-39.1	-44.1
43	GEN. MACH,SHOP PRD	660.7	120.4	117.4	74.0	19.6	99.2	137.0	88.9	65.3	21.2	-19.6	-14.9	-45.8
9	ORDNANCE & ACCESS.	194.7	98.5	442.5	290.2	169.5	84.9	443.2	287.9	171.2	13.6	-0.7	2.3	-1.7
68	MISC. ECON. SECTOR	3434.1	98.5	74.0	42.5	16.9	103.2	234.8	310.8	203.0	-4.6	-160.9	-268.3	-186.1
37	CNSTCTN,MIN,OIL EQ	288.9	88.9	16.6	5.6	-24.2	13.3	19.2	9.6	7.3	75.6	-2.7	-4.0	-31.5
44	COMPUTERS, ETC.	183.8	83.9	12.6	1.0	-19.2	9.0	11.6	7.0	5.6	75.0	1.0	-4.0	-24.9
STOCKS AND NET CHANGES		22040.1	4886.9	4083.6	1968.6	981.2	2993.6	4699.2	2893.8	2176.6	1893.3	-615.6	-925.1	-1193.5
PERCENT: TOTAL ECONOMY		74.57	85.68	88.90	87.95	93.15	86.77	88.64	89.52	89.85	83.95	86.85	92.86	87.13

requirements for all 68 of the industrial categories used for this study, plus estimates reflecting a maximum 20% and 40% surge for both types of machine tools.

Attachment I

Assumptions of the 1983 Stockpile War Scenario

Stockpile Planning Period

The 1983 stockpile war scenario is predicated upon the simultaneous occurence of a World War II-type of conflict with two Korean/Vietnam-types of limited "one-half" wars, all of indefinite duration. Under this war scenario a 12-month warning period is also posited, during which time the United States recognizes sufficiently the probability of these particular wars to be able to engage in military and economic wartime planning. Within this context stockpile commodity goals are designed to insure the availability to U.S. producers of sufficient quantities of strategic and critical materials to support the production of military and essential civilian goods, as well as to maintain the basic industry necessary to wage the wars successfully for the first three years of the posited war scenario. In addition, exports of such materials to wartime allies may be required.

Zone of Action

In the 1983 stockpile war scenario, the World War-II type war occurs in Europe while the two one-half wars take place in the Korean peninsula and the Persian Gulf. While the NATO and Warsaw Pact countries are engaging in full conventional war hostilities in Europe, the United States also must fight Iran and North Korea and their respective allies in each of the two regional brush-fire wars. The United States bears the responsibility for furnishing substantial portions of its allies' military, industrial, and other supplies that are unavailable domestically or from interdicted foreign sources. Specifically, materials from communist-bloc countries and from the war zones (i.e., countries in Western and Eastern Europe, the Mediterrean basin, the Persian Gulf, and the Korean peninsula) are assumed to be unavailable to the United States for the duration of these wars.

Direct Military Requirements

In response to the posited wartime environment, the first task of war materials planners is to satisfy the military goods requirements. The Department of Defense has estimated these requirements, in constant dollar values, for 30 classes of war goods for the warning year and the first three years of the conflict. Under this conventional war scenario, total real expenditures by the Department of Defense grow more than 900 percent during the four-year period.

The military force of five million men, which was assumed under the previous full mobilization scenario, is inadequate to fight successfully the expanded range of conflicts under this scenario. For the 1983 stockpile war scenario, an eight million man force and [illegible] mobilization by the United States is necessary. The "balanced force" staffing concept of the Department of Defense is used to determine the force requirements. In determining the military equipment requirements that the stockpile must support, a variant of the fixed military activity/technology coefficients for equipment per soldier is applied to the required military activity strength levels. These military expenditure estimates reflect some activity substitution (i.e., substitution in favor of lesser mechanized activities) within the overall military mission

as well as flexibility in the application of technology coefficients. These adjustments are needed to accomodate inadequacies in the U.S. mobilization base that are forecasted and the insufficient capability to outfit eight million soldiers at the current extensive military capital equipment and mechanization levels.

Essential Civilian and Basic Industrial Requirements: Domestic

To satisfy the military demands, a crash mobilization investment program is instituted during the pre-conflict warning year and during the early years in the war. This crash investment program is needed to build up the mobilization base capacity--largely in the manufacturing durables, chemicals, rubber, petroleum, and such direct military industries as munitions, ships, planes, and communications. To facilitate speedy capital equipment formation, a massive DPA investment loan program allocating $125 billion (1972 dollars) annually is required. Investment incentives are provided by wartime investment tax credits, accelerated Korean War-type depreciation, shorter tax lives, and supply priorities for materials, labor and credit. Up to 75 percent of pre-war sector resources need to be reprogrammed from materials-intensive consumer durables to nondurables, services, and savings. Similar resource transfers from housing and all non-industrial construction to manufacturing plant and equipment are necessary to produce the construction industry output required for the war. A reduction in federal grants to state and local governments produces reduced spending and employment in those entities. Civilian federal government programs and transfer payments are reduced in response to higher priority demands for resources by the private and defense sectors and resulting low unemployment rates.

Essential Civilian and Basic Industrial Requirements: Trade

Exports of materials are controlled. They are reduced 7 percent overall and reallocated in terms of destination and type of export goods. Petroleum, food, materials, and war goods are exported to our wartime allies under various preferential trade controls or outright military aid. Free trade permits unlimited U.S. imports during the warning year. After the conflicts begin, all war zone imports are lost to the United States. Expanded production, however, takes place outside of the war zone because of high wartime demands and prices. These suppliers' exports to the United States grow rapidly. However, shipping losses are assumed to prevent imports of military tier materials except from Mexico and Canada. The shipping loss schedules developed by the JCS apply to civilian imports, with greater losses incurred for materials from faraway sources shipping over endangered shipping routes. The least loss is assumed for high value/weight materials for which air-shipment is economical. If the exporting country has a favorable political orientation, is economically stable and self-sufficient in wartime, possesses reliable labor and capital inputs secure from sabotage, and is economically committed to or dependent on U.S. wartime markets, then civilian imports from such sources are discounted less.

FEMA Analysis of Policy Issues
In the Industrial Mobilization Base Study
Of the National Defense Stockpile War Scenario

Issue 1: How should wartime GNP forecasts take into account materials, capacity, and labor constraints for policy evaluation and planning purposes?

Many current materials shortages, industry capacity bottlenecks, and labor skill shortages need not constrain the wartime economy. Mobilization planning can indicate the need for larger stockpiles to expand wartime supplies. Industrial capacity bottlenecks can be alleviated by DPA investment incentives, given sufficient leadtimes. Proposed DPA worker retraining can now start to expand the number of workers possessing skills in highest demand in the war economy. Thus FEMA assumes a "crash" reindustrialization investment program of $125 billion (in 1972 dollars) annually starting in the warning year. These DPA investments are targeted largely within the manufacturing durables industries to facilitate necessary expansion of the mobilization productive capacity as quickly as possible. Therefore shorter gestation DPA equipment purchases are favored over DPA industrial structures featuring longer construction periods. Our simulations indicate massive industrial bottlenecks and runaway inflation are likely without this DPA mobilization base expansion. Due to long plant and equipment construction lags, exacerbated by simultaneous demands made by many manufacturing industries on the same capital suppliers, DPA and market induced capital spending will not result in completed capacity expansion until 3-4 years later. Hence DPA programs are necessary to relax capital bottlenecks occurring as the wartime full employment and capacity ceiling is approached in the later war years by concentrating investment demands early in the war while capacity is still ample. DPA programs simultaneously must be instituted in the warning year to retrain labor to perform engineering, metals working, and other technical blue collar skills in an expanded manufacturing sector necessary to support the war effort. The technical nature of the production skills required has increased the training time required to between 6 months and 4 years, and has reduced the possibility of task division whereby lesser skilled persons could quickly learn how to perform specific tasks within a skilled job.

Planning models can assume that the government via the above "visible hand" mechanisms will supplement the market's invisible hand incentives operating to mitigate resource constraints. For example, employers as well as employees have an incentive to retrain and upgrade worker skills after a high labor demand economy has existed for some time. Resource constraints drive up scarce resource prices to 1) encourage additional investment in capacity and training to augment these currently (or foreseeably) scarce resources, and 2) provide a cost savings incentive for current industrial and other users to economize on these resources for now. FEMA macroeconomic models assume the existence of current U.S. economic structure in wartime. That is, existing markets and market incentives will be used to the maximum extent possible to reallocate and expand resources to eliminate bottlenecks to additional war production. Labor shortages can be mitigated by providing real wage good incentives for skilled workers to work longer hours, new workers to enter the wartime labor markets, and qualified workers to immigrate to the United States. The substantial wartime growth of civilian goods, if not competing with the war sector for scarce inputs, is necessary to alleviate labor "shortages" otherwise likely to develop during a lengthy war.

In the developed U.S. market economy, even in wartime, there exists inherent capability and incentive to substitute around materials, capacity, and labor shortages. Thus substitution effects rather than output losses are the likely initial results of the wartime economic growth colliding with these resource constraints. The Chase Econometrics and Wharton Macroeconomic Models both structure these resource input shortages within Cobb-Douglas or nested CES production functions permitting substitution away from currently scarce inputs. The substitution terms of trade are represented by the elasticity of substitution between scarce and non-scarce inputs. Thus resource constraints are not perceived by most U.S. econometric models as an absolute bar to further wartime GNP growth. Certain industries output may be constrained by the need for scarce specialized labor and materials in higher priority war industries. The remaining resources not required by war industries should be allocated via the market to produce lower priority consumer and other goods needed to induce the widest labor participation. FEMA strategy is based upon labor supply studies which indicate labor participation, hours worked, labor productivity, training, and even immigration expand with an increasing real wage expressed in purchasing power over consumer goods. In the long stockpile war, resorting to unnecessary consumer austerity is likely to yield labor quality and quantity shortages impervious to appeals to patriotism alone. Labor constraints are dependent with the degree of consumer austerity imposed. Austerity imposed because of forecasted wartime labor shortages will contribute to creating such shortages.

With longer leadtimes, most models predict higher production via extensive resource substitution becomes possible--jobs and production facilities can be redesigned and new capital purchased which economizes on scarce resources. In general, the elasticity of resource substitution increases with the planning time horizon. Only in the fixed input-output production function do current resource constraints dictate overall output restraint associated with a wartime austerity program rather than additional output growth via input substitution. Stockpiles and imports can relax some of these resource constraints.

FEMA considers OMB's "limiting resource constraint" approach to estimating wartime GNP as imparting an unpredictable downward bias to GNP to such an extent to endanger the civilian support necessary for the U.S. winning the war. This bias is totally absorbed by the non-defense sectors. The economy is constrained to its minimum existing aggregate resource (among petroleum, labor, and capital) as estimated a priori using World War II patterns of labor participation, productivity, and capacity utilization growth. Since many specific labor, petroleum, industry production, and capital demand and supply functions must be forecast now in peacetime to determine maximum wartime quantities in a hypothetical wartime environment, forecast and aggregation errors are likely to be great. Maximum resource quantities are not invariant except for markup constants over war scenarios four decades apart. This aggregate OMB mental model of the constrained wartime economy represents an unsophisticated approach to macroeconometric estimation which ignores econometric models' general equilibrium nature, including simultaneous quantity determination by resource supply and demand responses to wartime and policy based supply and demand exogenous events. All supply-side structure and behavior change since World War II is ignored. Likewise demand, especially

substitution and interindustry relations structure, has changed so radically since world war II to make aggregate limiting resource planning based on World War II norms an unprofitable use of history.

Instead FEMA recommends either realistic or optimal policy simulations in which satisfactory or optimal results are achieved from the perspective of the war planners' utility function This function combines arguments with "tradeoffs" among war industries output growth, unemployment, inflation, and perhaps federal budget and trade deficits. This function is optimized over the war's horizon subject to the following constraints: 1) macroeconomic model, 2) NSC sector reprogramming (e.g.,consumer durables into nondurables, sevices, and savings), 3) imports lost due to war zone production disruption and shipping losses, 4) exports required to support allies (e.g., food, materials, military aid, and energy) and 5) DOD war goods requirements.

Although due to structural change, World War II historical experience cannot be intelligently utilized in imposing its labor participation, productivity, and capital utilization results as planning maximums, realistic war policy simulations with a macroeconomic model can be achieved by utilizing past successful wartime policy instruments. The analyst simply iterates within U.S. historical warime patterns of instrument mix and time profiles until the macroeconomic model achieves satisfactory wartime performance in unemployment, inflation, and production growth rates--perhaps disaggregated by sector--while satisfying the above wartime environment and policy constraints. Compared to OMB limital resource planning, wartime GNP is more likely to approach historical U.S. wartime norms and be a more flexible and informative planning tool under either optimal or realistic policy simulation strategies. Decision maker policy choices have an explicit planning input. The wartime economy is likely to exhibit unrealistically low growth, dangerously close to guaranteeing military defeat if planning is based exclusively on austerity and policies designed to reduce wartime demands within our current perception of the most restrictive resource constraints. Instead planning needs to focus on utilizing the macroeconomic and industry models to discover resource bottlenecks in order that they might be alleviated through planning. The stockpile size likewise should not be tied to the most restrictive complementary resource bottleneck--whether it be metals capacity, energy, or skilled labor. Some success in alleviating these bottlenecks should be planned for and assumed in setting strategic and critical materials stockpile goals.

Issue 2: Are DOD wartime expenditures unprecedently high in the Stockpile War Scenario and how should gross output requirements of DOD by industry to support these final DOD demands be estimated?

Flexible input-output model multipliers should be applied to alternative final defense expenditures to determine total defense requirement under various possible conventional wartime scenarios. Contrary to OMB's assertion, defense expenditures exhibited unpredecently low rather than high growth rates in the 1980 stockpile goals study. The 1983 study is based on Reagan Administration war scenario assumptions requiring double the 1980 DOD growth rates. Even these DOD expenditures seem quite modest in light of recent U.S. experience. Higher DOD expenditure growth patterns more consistent with World War II and U.S. historical wartime experience should be considered as the DOD demand driver of the linked macroeconomic and input-output models

for the stockpile scenario. If the stockpile war is designed to estimate materials requirements necessary to fight the chosen war scenario and all lesser wars, stockpile goals should be based on the largest probable conventional war rather than simply the most likely war. Total mobilization scenarios should be considered rather than the 1980 full mobilization scenario if materials shortages are not to constrain U.S. mobilization capabilities in conventional wars larger than the scenario on which the stockpile goals are based.

INFORUM model type bridge equations are useful in mapping from macroeconomic scenario results to industry final demands driving the input-output model. This is true for lower priority civilian demands which should be mapped into input-output bill of goods format separably from DOD demands but employ the same consistent macroeconomic scenario. The input-output coefficients should be flexible with respect to changes in relative prices and technology in order to accomodate extensive input substitution due to significant resource price and availability changes in the war environment. Materials input-output coefficients should also be variable to reflect tier specific risk planning whereby materials conservation and substitution is concentrated in the civilian production tiers where risks of inadequate production should be taken in wartime. Austerity decisions thus become industry specific and operational in terms of defense output saved for each specific war year.

Issue 3: How much consumer austerity is necessary in wartime planning?

Both the role of consumer austerity in wartime and America's twentieth century war experience of growing overall consumer expenditures in wartime provide a context in which to evaluate austerity assumptions both as to specific and overall consumer goods. Lower consumer purchases of durables such as autos and televisions serves to release strategic and critical materials and skilled labor inputs to the war economy for the production of tanks and electrical communication gear. Auto assembly lines can be converted to the production of jeeps. Likewise wartime policies such as selective credit, materials, and labor controls serve to reduce the demand and supply of houses in order to permit the associated productive labor and materials to be reprogrammed into higher priority wartime construction utilizing similar inputs and production technology. Due to massive military and industrial demand growth, wartime energy shortages would result unless lower war priority uses such as consumer gasoline consumption are cut back by tax increases or rationing. With respect to these specific goods, one issue involves the efficiency of the mechanism used to reduce lower priority consumer demands: tax increases, rationing, physical controls, or credit controls. FEMA preferred to use tax increases and market oriented instruments first, but recognized such extensive resource reprogramming necessitated resorting to less efficient credit and physical controls also. The war policy mix between market oriented instruments (i.e., excise taxes) and specific demand/supply "physical balance" or credit controls in the various wartime markets (i.e., financial, materials, labor, etc.) requires an explicit policy judgement.

Overall consumer austerity, to the extent advocated by OMB, does not serve the war economy planning function of releasing specific resources needed for war industries. Many consumer goods utilize resources not needed by the war

economy--especially since these low priority industries have the greatest resource shortage incentive to substitute away from war materials. Overall wartime consumption levels have declined substantially when the wartime country has its production base damaged by bombing, interdiction, or invasion. Reduced overall consumption per capita is likely to foster reduced morale, labor participation, and dysfunctional black market trading activities.

Overall austerity can be a resultant of excessive or wasteful demands by the war sectors on the civilian "slack" sectors. Planning helps to eliminate such demands. Severe consumer austerity usually occurs on the losing side of modern wars and reflects wartime production dislocation and wartime damage to the nation's capital and skilled labor base. Although the entire consumer sector is a "slack" sector for war planning purposes, consumer sacrifices are not desired for their own sake--whether misconceived as equalizing wartime sacrifices or giving the civilian sector a vicarious sense of participating in the war. War sector output is more likely to benefit from civilian sector sacrifices made in terms of expanded labor supply efforts rather than consumption sacrifices. War economy demands could be far higher than currently forecast--most likely since the stockpile war serves as a planning envelope of many different possible types of conventional war scenarios. Some worker/consumer "producer rent" must be left in the overall consumer sector to provide reserve resources in the event a more extensive conventional war or more intensive DOD resource demands occur than are assumed. Wartime demand forecasting is inexact. Also the variable risk system is based on the proposition that wartime costs of inadequate defense supplies are far greater than those connected with excess DOD supplies in wartime. Consumer austerity is already built-in to the planning factors since greater risks of consumer goods shortages are explicitly taken in deriving stockpile goals.

Historically the U.S. has not won wars through imposition of overall consumer austerity such as measured by declining real per capita consumption during wartime. The 72% growth in real GNP between 1939-1944 permitted an astounding 5500% growth in constant dollar war output. Yet Simon Kuznets research also revealed that constant dollar consumption expenditures grew 20% in 1939-1944. Within consumption, services and nondurables gained every war year so that each was 26% greater in constant dollars by 1944. Consumer durables also gained 33% in the 1939-1941 "warning period",but plummeted 48% during the 1941-1944 war period. World War I exhibited a similar pattern of austerity in terms of greater production rather than less overall consumption per capita. Real GNP grew 20% in 1914-1917 while nonwar output grew 10%. This gain in overall consumption did not prevent constant dollar war output from growing 3130% between 1915-1918.

The recent Korean and Viet Nam partial conflicts present cases of even larger U.S. consumption gains in wartime, even in consumer durables. From 1949-1953, real GNP increased 27.4% while consumer non-durables, and services gained every year and grew 13% and 17% respectively. Consumer durables expenditures fell only 11% between 1950-1952, but gained 24% between 1949-1953. These consumption gains did not prevent current dollar defense spending for goods and services from growing 245% between 1950-1953. Constant dollar defense spending grew 36% between 1965 and 1968, the Viet Nam spending high. During this same period, real GNP and consumption spending gained every year and registered 14% growth overall. Likewise, real expenditures on consumer

durables, nondurables, and services increased throughout the Vietnam conflict to accumulate 20%,11%, and 14% overall 1965-68 growth.

Far from being unprecedented, GNP, defense, and consumer spending growth forecast in the stockpile war scenario underlying the 1980 goals appear to be too low in light of twentieth century U.S. economic history in wartime. Only the peacetime baseline turned out to be overoptimistic in terms of the actual dismal U.S. economic performance of 1979-1982. As a result, much of the consumer austerity programmed for wartime as well as the specific cutbacks in consumer spending on housing and durables occurred in peacetime between 1979-82. Consequently further demand cutbacks in these areas can be lower while still meeting 1983-86 resource reprogramming goals for redeploying to the war sectors labor, capital, and materials formerly attached to the consumer and housing industries. Due to 1979-1982 abnormally low rates of durables and housing purchases, consumer stocks of both are now low relative to equilibrium or desired levels. Thus less consumer austerity is possible now through dissavings resulting from consumption without replacement of existing autos, durables and houses. Overall consumer austerity does not reduce stockpile goals significantly beyond that obtained by materials intensive durables and housing output reduction. The additional consumer nondurables and services do not consume significant strategic and critical materials, except for civilian energy uses constrained by rationing, gasoline tax increases, and queueing under current FEMA wartime energy policy assumptions. Based on the above considerations, FEMA war modelling often solves for overall consumption expenditures as a residual after higher priority military and investment spending targets are met. Being a slack sector, achievement of overall consumer austerity targets is given much less weight by policymakers than other sector targets. Even modest overall consumer growth within historical wartime guidelines can contribute the war effort via morale and greater labor supply if durables and housing resource reprogramming targets are achieved within overall consumer spending. In contrast, severe overall consumer austerity with total consumption reduced in excess of 20% occurred in World War II Germany, Britain and Japan. As a result, these countries lost "human capital" and experienced great difficulty rebuilding their peacetime economies after the war. They needed substantial U.S. economic, technical and managerial foreign aid. No wartime planner should assume this degree of austerity or the availability of such foreign aid inflows for post-war rebuilding. Planners need to assume sufficent reconversion resources.

Issue 4: Are stockpile scenario assumptions concerning a massive wartime DPA investment program consistent with future years' output and capacity estimates by industry?

Compared to other twentieth century wars, the U.S. productive capacity to support required mobilization demands is now inadequate and becoming more so every passing year. For example, U.S. steel capacity has declined 10% in recent years. The long run U.S. market trend toward ever increasing output shares by the service sector and declining share of GNP by the manufacturing sector has been accentuated by the 1979-1982 recessions. A prolonged conventional war would reverse this long run trend and recent cyclical experience by requiring massive output expansion in the manufacturing sector. The current inadequate capital base in the manufacturing industries would prevent

this defense required increase in manufacturing production just as inadequate materials and skilled labor shortages would. However, the crash DPA investment program as well as longer run market oriented investment incentives as shorter tax lives, greater investment tax credits, and Korean War type accelerated depreciation schedules for selected war industries (largely manufacturing durables but also including rubber, chemicals, and energy production and refining) will simply create high war priority demands in the warning and early war years. Most of the resulting capacity expansion will occur after

the third war year of this war scenario of indefinite duration. Hence it is not inconsistent for industrial capacity to grow much slower than DPA and market induced investment expenditures by industry during the early war years. In the 1982 study, total investment demand is broken down by industry in the INFORUM model linked to the Chase Econometric Macroeconomic war scenario. Feedback consistency from input-output capacity constraints to macroeconomic model prices and investment is provided by war simulations of the Wharton Model.

Construction lags for each industry are estimated in the Wharton Annual and Industry Model based on peacetime experience. There is at least a 3-4 year lag between investment expenditure and its capacity expansion response in the manufacturing durable sector. In addition, there are often substantial investment decision and finance lags composed of time that decisionmakers need to recognize the capital shortage problem and formulate an operational investment plan as well as the time needed to obtain financing. Banks and government financial sources must be convinced to fund these projects since internal corporate financing is unusual for wartime capacity expansion projects. These financial investment decision lags alone took 18 months with respect to World War II capital projects involving construction of new rubber processing plants. The decision recognition, investment plan formulation, financing decision, and construction gestation lags, unfortunately, are additive and operate to guarantee capital spending will add much more to demand than to supply expansion during the first three war years. When capital spending is needed to expand production capabilities to produce long gestation military goods as ships and aircraft, investment lags are compounded by military construction lags once the investment capacity is operational. These lags have increased with sophistication and number of subcontractors for military weapons. As a result, new ship designs take up to 10 years to become operational. OMB appears to minimize gestation lags even in peacetime and to ignore these other lags between increased demand and its supply response. Start-up costs and frictional resource redeployment delays involved in initiating even a modest peacetime mobilization base expansion has been significant impediment to early progress in the Reagan defense rearmament program. Thus a DPA program is needed just to reduce the lags delaying effective investment expenditure demands in wartime, but DPA provides no assistance toward reducing capacity gestation and defense output lags.

Since the stockpile war scenario covers only the first three years of a conventional two front war of indefinite duration, these investment expenditures are justified by their substantial payoff in later war years. DPA investments are concentrated in shorter payoff areas. Lags are longer for plant structures than for new equipment construction. Hence equipment spending is emphasized

by DPA. Gestation lags tend to be longer in responding to investment demands at the earlier stages in the production process. Thus new mines take longer to find and open (up to 10 years) than do metals refining plants. On the other hand, recent movement of U.S. metals refining capacity abroad may militate in favor of upgraded stockpile materials purchases to fill U.S. materials requirements in the "D to P" period before adequate U.S. refinery capacity is reestablished. Long metals industries gestation lags are one reason metals industries and especially mining do not receive even greater DPA investment financing. Metals output responses are likely to occur after the war is over. Due to extensive excess capacity throughout the manufacturing sector, output can grow much faster than capacity in the early war years until full capacity is reached. Both military and investment demands are concentrated on the manufacturing industries. Most of the metals industries output growth at home and abroad occurs in response to these increasing demands in industries experiencing ample excess capacity early in the war period. Production grows from current business as usual (schedule A levels) to full capacity (schedule B). Full capacity itself grows as current investment projects are completed and capacity is added. Due to metals and mining gestation lags of more than 3-4 years, these schedule B estimates do not reflect increased wartime investment expenditures until the fourth and later war years (beyond the stockpile war planning horizon).

Industry capacity is more appropriately defined in a physical than an economic sense (lowest point on average cost curve) since maximizing production capability rather than minimizing inflationary cost pressures is the planning objective. Although currently inactive and inefficient plants will be added to capacity, capacity utilization is an economic rather than a technical variable. On a 24 hours a day, 7 days a week schedule (except for maintenance and downtime) appropriate for wartime, U.S. capacity utilization averages currently around 20% rather than the 70% indicated by FRB indices. On the conventional basis of one eight hour shift, 5 days a week, I. Siegal and others concluded World War II industries sometimes averaged 150% capacity utilization. Obviously capital user costs rise to reflect increased maintenance, shorter capital life, and reduced output quality of such intensive scheduling. Some continuous process manufacturing plants already operate on this schedule so no further gains are possible. For others super capacity utilization represents a short run possibility until additional capacity is on-line. The advanced average age of the existing mobilization base work force and lengthy training periods before additional shift workers are available, may limit some output gains possible by operating with multiple shifts using the same plant and equipment.

In the 1980 study, metals industries output was 20% greater than capacity. This was partially due to stockpile releases of metals and upgraded forms which function to relax the metals capacity constraint on current supply. Due to decreasing minerals content in metals products and increased value added shares, minerals output grew much slower than processed metals output forecast by the model. In addition, minerals imports and minerals stockpile releases provided the supplementary materials inputs necessary to support this high growth rate of metals production despite much lower domestic mineral production expansion rates.

Like labor participation and productivity, capital productivity and capacity

are endogenous economic variables likely to be stretched in wartime rather than to absolutely constrain the economy once past maximums are reached. Unfortunately gestation lags between investment demand and its supply expansion response will also stretch in wartime as unprecedented investment demands by all the manufacturing durables and other war related industries expand at the same time. Their capital suppliers have inadequate productive capacity to meet these demands since these investment demands have historically been highly cyclical with little significant secular growth in recent decades. Hence the influx of unfilled orders and growing backlogs will lengthen the delivery times, even assuming these capital supply industries have labor and materials priority.

Issue 5: What is the relation of economic policy assumptions to the Economic Model used to represent the U.S. wartime economy and to the Wartime Planner's economic objectives?

The economic model provides the most important set of behavioral linkages between objectives such as minimizing unemployment and inflation, and policy instruments (e.g., various fiscal and monetary instruments) used to accomplish these objectives. After satisfying constraints such as achieving specified minimum growth rates for defense goods production, there are sufficient policy degrees of freedom left to achieve civilian objectives either necessary or desireable for a wartime economy. FEMA often has chosen to minimize the misery index (inflation rate plus unemployment rate) over the war's horizon. The specification of the planner's utility function represents a major policy issue. Maximizing real growth in high priority industries is one alternative utility function. Minimizing federal government deficits or balance of trade deficits during the war represents another utility function, but one which would twist the wartime economy in an entirely different direction and greatly reduce wartime GNP growth, especially in the civilian economy.

Alternatively, planners may prefer not to derive fiscal and monetary policy mixes and instrument settings from their wartime utility function via macroeconomic model linkages. Intransitivity in aggregating individual utility functions may prevent the establishment of a consistent social utility function. Different macroeconomic models provide different sets of instruments and relations to various potential target variables in the decision makers utility function. If the target-instrument optimization approach is eschewed only because the decisionmaker is uncertain as to the accuracy of the macroeconomic model's relationships, he does not have to retreat to making assumptions about important endogenous variables such as the wartime path of the real interest rate and the Federal budget deficit. These variables should be derived from the model rather than input as assumptions, since they do not enter the decisionmaker's utility function or represent unalterable wartime exogenous variables. Choices as to the appropriate policy mix must be made if the target-instrument approach is not used to derive an efficient policy mix. Such choices may be made on the basis of what the public will 1) accept as legitimate or 2) expect and thereby reinforce to accelerate policy effects according to rational expectations theory. Model sensitivity analysis for substitute policies (e.g., monetary aggregates versus interest rate indicators) and instruments (excise taxes versus industry controls) can help. Policy instrument choices in previous wars is an excellent starting point. Variations from this historical path could be chosen to improve the utility

function score and can be as simple as reducing the model's inflation and unemployment results during the war.

Relatively favorable wartime unemployment and inflation results were achieved in the 1979 stockpile war scenario by utilizing these variables' World War II performance as target variable values in the planner utility function. After a number of policy iterations, non-war policy instruments chosen and set to achieve these results include 1) monetary policies festuring rapid monetary aggregate growth rates and negative real interest rates , 2) selective wage-price controls on problem sectors to prevent cost-push inflation pressures, 3) credit,materials,labor, and trade controls to facilitate sector resource reprogramming, 4) heavy consumer excise taxes on durables, homes, and energy use, 5) consumer rationing of food and energy, 6) government programs to expand production of energy, food, and mass transportation, 7) massive capital expansion program early in the war based on DPA programs and tax/ credit incentives , 8) trade policy designed to maximize the absorption of foreign resources (especially net imports of war materials), 9) cutbacks in federal transfers to state/local governments, and 10) a full-employment budget surplus reduced substantially in the warning year and gradually raised throughout the war. Similar war scenario simulation results occur whether this war policy strategy is implemented on the Chase/INFORUM or the Wharton Annual/ Industry Models. The peacetime prospect of high structural federal deficits throughout the 1980's and weak U.S. economic performance relative to the 1979-1982 "consensus" baseline will adversely affect model results in the 1983 stockpile war scenario.

FEMA has relied upon moderate wartime changes in many alternative instruments rather than depending on extreme changes in a smaller number. After all, most instruments finally exhibit diminishing rates of marginal productivity and all instruments should be used up to this point. Compliance avoidance and misallocation incentives are reduced by overlapping policies (i.e., interest rate and qualitative credit controls) . All the OMB policy variables in task 3 are either policy instruments or endogenous indicator variables closely related to instruments and unlikely to be ultimate target variables in the wartime planner's utility function. Hence apriori chosen policies, assumed as OMB recommends before their model consequences are known, are likely to constrain GNP and military sector growth and yield unsatisfactory wartime performance whatever the planner's actual objective function. In short, these instrument and endogenous variable paths should be derived rather than assumed, unless many alternative feasible paths are simulated for policy sensitivity analysis. Both the Chase Econometric/INFORUM and Wharton Annual/Industry Models used in war simulations have a well developed monetary sector. Both contain a real side incorporating many relevant war environmental dummies and war relevant policy variables lacking in the controversial St. Louis Fed Monetarist Model.

Issue 6: What international trade planning assumptions are prudent for the stockpile mobilization scenario and stockpile goal setting?

In the successful war effort like World War II, the U.S. absorbs substantial resources from non-war zone foreign countries by expanding imports necessary to fight the war and expand domestic production. At the same time, the U.S.

uses trade and investment controls to reduce outflows of exports and capital likely to aid the enemy or not contribute to military and production activities of our allies. Huge inflows of "flight capital" from war threatened areas helped the U.S. finance the resulting negative balance of trade. Exports and investment outflows are within the policy reach of U.S. trade and investment controls in wartime while imports and capital inflows are not. Thus past war norms can be achieved for exports, but do not necessarily apply for imports. Increased enemy shipping interdiction capabilities have not been reflected in higher shipping loss assumptions. Shipping losses were assumed to be only 1% in the 1979 study. Hence even in an unbiased expected value sense, imports should be reduced below past U.S. wartime import achievements and model forecasts to take into account likely shipping losses and current inadequate shipping transportation capacity.

For planning purposes, the U.S. stockpile policy should not be based on the "expected value" wartime import level, much less the" best case" presumption that past fortuitous flows resulting in substantial net import balances will reoccur in our next war. In task 6, the OMB international materials supply estimation procedure represents an even more optimistic trade scenario in which the U.S. imports 1) the entire world exports no longer sold to war zone countries (100% materials trade diversion to the U.S.) and 2) 100% of the additional materials world production capacity added in wartime. There is no historical precedent for such wildly optimistic trade scenarios. Not only are they too improbable to serve as trade planning assumptions, but such scenarios ignore negative factors OMB acknowledged in task 2 (International Trade) as reducing imports: 1) lower country political reliability, 2) lower exporter economic (trade) capability due to loss of foreign capital inputs and shipping facilities, 3)increased foreign country consumption of potential U.S. exports due to wartime prosperity, 4) increased U.S. market shipping losses, and 5) diversion of U.S. and foreign ships to military uses. Overall international trade has declined steeply during twentieth century wars.

The modest 7% decline assumed for U.S. wartime exports in the 1979 study reflects early World War II experience, although substantial export gains were registered in 1943-45 and in more recent wars. Exports grew rapidly in the World War II warning period, 1939-41. Like exports, imports rose strongly once the U.S. began to win World War II. However there was no import gain in 1942 when the outcome was in doubt and shipping losses were the greatest. In more recent limited wars, U.S. imports rose continually for both war and civilian goods. FEMA currently assumes that the war zone countries trade with the U.S. is completely cut off once the war begins. The war zone country exports of each commodity imported into the U.S. are assumed lost once the war begins for the war's duration. These imports total 38% of pre-war U.S. imports when averaged over all commodities. However, the macroeconomic model's import equations permit increasing U.S. wartime demands and relative prices to absorb increasing imports as the war progresses by increasing U.S. import shares of growing total imports from non-war zone exporters. These gains reflect increased trade diversion creating new U.S. export sources in non-hostile countries whose war zone markets have been cut off. As a result, real imports grew faster than 20% in 1980-82 in the 1979 stockpile war scenario.

In contrast to utilizing the Macroeconomic model's trade sector to estimate likely trade diversion and expected wartime import gains, the OMB trade scenario exclusively focuses on only those trade planning factors which could expand U.S. net wartime imports. OMB's approach ignores those planning factors which diminish net U.S. absorption of foreign resources. Instead of following OMB's materials import scenario which represents a more optimistic trade scenario for materials than for other wartime trade (compare task 6 with task 2 trade factors), a more prudent policy involves making less optimistic materials trade planning assumptions since these materials are strategic and critical. Compared to all traded commodities, the U.S. stands to lose more wartime defense output at highly valued wartime prices if a dollar of these materials is not available from abroad to supply American production processes. The stockpile "variable risk" policy could be extended to portray a more pessimistic wartime materials trade outlook for stockpile planning purposes than was likely for overall U.S. wartime trade. If materials imports realized in wartime are less than forecast by the unbiased econometric model in half of the scenarios, this risk may be too high to bear for stockpile goal planning purposes. In light of the excessive defense costs of a strategic and critical materials "stockout" in wartime , a 50% chance of inadequate stockpiles is too high a risk to bear. Unfortunately, this is the result of using unbiased econometric forecasts of imported strategic and critical materials in stockpile goal calculations.

Issue 7: What type of materials demand estimates and materials allocation mechanisms are most appropriate for planning purposes in the wartime stockpile scenario?

Current materials modelling is based on time trended materials consumption ratios for each input-output activity. In effect these stockpile commodity MCR's are appended to the existing input-output technology table. They are added to the bottom of the table as dummy stockpile industry distribution rows via industrial product redefinition transfers from the existing industries which include these stockpile commodity industries. These MCR coefficients are larger for the DOD tier than for the civilian tier demands, but do vary to reflect the production technology of each materials using industry. These MCR input-output coefficents change by year according to their historical trend. To the extent prices are correlated with these trends, commodity price elasticities are incorporated in these annual MCR changes.

One could argue that wartime prices will not follow past peacetime time trends; however, historically in wartime neither the U.S. nor its materials producers (largely in oligopolistic markets) have utilized competitive markets and prices to allocate scarce strategic and critical materials among potential war demanders. Materials controls eliminate demand from lower priority uses except for black markets. Producers use non-price methods of allocation, often involving giving priority to supplying established customers their customary purchases, rather than continually raising prices as long as demand exceeded supply at current prices. The government uses DPA title I allocation authority rather than paying higher prices to ensure military users of strategic and critical materials. Unrestricted use of free markets to allocate materials would require that government budgets would be greater and military contractor costs higher. Undesireable wealth distribution consequences (i.e.,

creating wartime materials millionaires) are another reason the U.S. has not utilized markets and prices more to allocate wartime supplies, even if high priority wartime industry demanders could outbid black markets and lower priority uses for the materials. Materials price increases could initiate a wartime cost-push spiral to exascerbate demand-pull inflationary pressures. Materials are characterized by short run demand and supply inelasticities that make drastic price increases necessary in order to clear wartime materials markets in response to tremendous increases in inelastic military and investment derived materials demands. Stockpile inventories are released to high priority users at much lower than such market clearing prices to alleviate many of the disadvantages of wartime price competition and market allocation. Inventories, queues, rationing, priorities and backlogs, rather than prices, have historically been used to clear wartime markets in a materials balance planning sense.

Even if materials were allocated by markets, OMB's proposal--to estimate their short and long run elasticities and then the consequent materials savings based on estimated likely wartime price increases--is inconsistent on several counts. First, substantial materials market structural change will occur with the onset of war. Some of these changes are described above; they will destroy any demand and supply elasticities predicated on peacetime data and market structure. OMB's consumer rationing scheme alone--to achieve 25%, 50%, and 75% materials consumption reduction--would destroy any prior price elasticity estimates assuming no rationing. Wartime material prices can not be estimated by demand functions alone, even if correctly specified and estimated for hypothetical wartime conditions. Materials supply equations are needed even for partial equilibrium solutions. This OMB proposal could come closest being accomplished through a series of materials econometric models linked to the wartime macroeconomic model, as the Chase Econometrics Commodities Models are. Then these models are iterated to consistent wartime solutions between the macro and commodity models in a similar fashion to the way the linked Chase Macroeconomic and INFORUM input-output models are iterated to consistent as well as desireable solutions.

Complete specification of the cobalt demand function would avoid OMB task 7 errors such as confounding materials consumption reduction due to substitution, one of the determinants of demand price elasticities, with lower demand because of reduced activity levels experienced by cobalt end use industries. Even holding all cobalt activity variables constant (actually their structure and size will greatly change in wartime), price elasticity estimates can not be fully equated with materials substitution possibilities in the manner OMB suggests. Elasticity of final demand, market share of cobalt materials costs relative to final product costs, and elasticity of supply of complementary inputs also enter into derived materials demand elasticities. Final demand becomes more inelastic in wartime and materials derived demands are likely to follow. Non-market war adjustment processes are likely to change the relationship between short and long run elasticites from that established by peacetime data based on market processes.

Contrary to OMB assertions, stockpile materials substitution is based on the maximum technically feasible substitution. This includes any feasible production process redesign, intermediate product redesign, and final product redesign away from the scarce strategic and critical material. Conceiveable

material price changes necessary to cost justify going to this limit of technical feasibility were extreme from the late 1970's time perspective of the FEMA materials substitution studies. Although becoming dated, these studies are likely to come closer to deriving specific substitution rates for strategic materials for particular end uses than would OMB statistically estimated price elasticities based on old time series and cross sectional data. These substitution studies ask the right question for war feasibility planning and need not try to distill substitution data from multi-cause elasticity data based on peacetime market structure. FEMA substitution data could indicate the extent to which OMB's 25%-75% materials rationing scheme can lead to materials substitution rather than the more serious wartime austerity losses of civilian output calculable on a fixed material I/O coefficient basis.

Issue 8: What is the role and the impact of the mobilization year in stockpile war scenario planning?

Contrary to OMB conclusions in task 8, supply estimates are considerably greater when a mobilization year is assumed. Macroeconomic model results indicate that substantial increases in capacity are starting to come on stream by the third war year for key industries in the mobilization base. This is possible because the warning year was available with its underemployed resources to devote to a crash DPA capital formation program. Inflation and consumer austerity are much greater while real GNP and investment are much lower in simulations without this warning year assumption. The mobilization base is lower and does not grow dramatically later in the war since there are no spare resources and time to devote to a crash investment program. Likewise, materials supplies are lower without the warning year preparation time to facilitate the adjustment from business as usual production (schedule A) to full capacity schedule B production in response to wartime demand and price incentives. Supplier rational expectations as to the likelihood of war, generated during the warning year, will facilitate the transition to higher production levels with fewer startup costs and frictional resource reallocation losses. Materials demands are lower without a warning year because the level of military effort is lower and consumer austerity is unprecedently severe, due to less time for military mobilization and industrial base preparation. Since stockpile goals are lower, the no warning scenario represents one of the many lesser war scenarios enveloped under the more general stockpile war scenario. Hence production interruption insurance against the stockpile war contingency of materials supply shortages and foreign import interdiction, also covers the no warning year conventional war scenario involving a NATO/Warsaw Pact European confrontation similar to World War II. This no warning war scenario has not involved additional minor wars in previous NCS war scenario formulations simulated as part of the 1979 study.

Stockpile planning is based on Interior commodity experts' schedule B forecasts of domestic and foreign minerals industries' current full capacity as well as wartime capacity expansion capabilities. Stockpile supply estimates must discount foreign supply expansion due to long gestation lags which imply capital projects must already be underway in order to contribute materials exports within the next 4 years. There is an abscence of U.S. policy

control over wartime foreign investment programs in mining and metals. Many foreign countries experience wartime difficulty in obtaining foreign capital, replacement parts, materials, energy and financing inputs necessary to complete mining and metals investment projects. Without a warning year permitting free trade and uninterdicted U.S., European, and Japanese exports of vital mining/metals project inputs, foreign mining and metals capacity expansion is likely to suffer differentially compared to domestic expansion.

Unfortunately, even with successful capital projects, long investment gestation lags imply little additional mine ore and concentrates will be forthcoming within the first three war years, despite the commencement of investment in the warning year. Existing mines which can be quickly reopened with substantial investment spending in response to higher wartime demand and minerals prices are assumed to be reopened in the schedule B scenario. Likewise current mine and metals capital projects have their ultimate capacity expansion factored into schedule B upon the project's estimated completion. This capacity comes on stream quicker with the impetus of a warning year. Even this supply response is at least a year slower without a warning year with free trade. Without a warning year, FEMA notes that stockpile goals could be higher because of the slower adjustment to full minerals capacity (schedule B) and lower wartime investment to expand foreign as well as domestic mines. However quicker advent of capacity expansion may not reduce stockpile goals since both stockpile demand and supply industries increase their wartime capacities under the warning year assumption. Generally the metals processing industries, which demand stockpile materials as variable cost types of productive inputs, have shorter capital gestation lags than the mining/metals fabrication industries which produce stockpile materials. Assuming both sets of industries have the additional warning year to expand their wartime capacity under market price/demand and DPA policy incentives, stockpile goals might increase to supply growing metals demand industries whose capacity comes on stream before that of the metals/minerals supply industries. Thus both stockpile commodities demands and supplies increase due to the warning year. The impact on stockpile goals is determined by metals demand-supply industries' relative capital gestation times. This is true both domestically and internationally. Rising real income levels in neutral foreign supplier countries will increase their domestic demands of high income elasticity consumer durables and houses. They are likely to absorb more of their own metals resources in response to their war generated wartime wealth. Foreign incomes and wealth are greater under the warning year scenario.

Issue 9: What is the role of country political reliability modelling in the stockpile scenario and who decides what are the determinants of country political reliability?

Country political/economic reliability forecasts are used to discount foreign country materials exports to the U.S. in the stockpile wartime scenario. FEMA attempts only to forecast country reliability in the sense of being a dependable U.S. supplier of strategic and critical materials in a specific war scenario. Country reliability naturally varies with the particular war scenario. The model incorporates different war scenarios by utilizing different sets of "war state" strategic policy weights with the same State Department country variables' scores. The 36 variables--country political

indicators and technical weights--and their incorporation within FEMA political reliability model design both were sanctioned in the Stockpile Phase II study at the Stockpile Steering Committee level, including State Department, OMB, CIA and NSC representation. These variables were selected under the aegis of a State Department chaired Country Political Reliability subcommittee.

These variables for each country are scored by the appropriate State Department desk officer subject to State Department regional review for consistency. State Department officials participate in review of the final country ratings and the world-wide political reliability scenario used. An explicit stockpile war conflict scenario is given to each State Department country analyst as an assumed world scenario upon which his ratings are predicated. Additional political indicators, including some region specific variables, might further improve country predictions, according to FEMA multivariate statistical analysis of previous country ratings. FEMA and State Department experts perform country misclassification discriminant analysis on all country ratings before use in discounting wartime stockpile supplies. Thus reliability simulations are selected in which country paradoxical ratings are kept to a minimum or appear paradoxical only to the non-expert.

The variables suggested by OMB in task 9 have little relevance to improved country political reliability modelling. Instead the evaluation subtasks B,C,D, and E repeat OMB policy bias for exaggerating these countries potential for replacing stockpile supplies. Task 9 largely reiterates task 6 criteria. Subtask D already is covered under the six indicators within the "Wartime Economic Sustainability of the Foreign Country" subfactor. Its "importance of foreign capital inputs" indicator measures Subtask D dimensions best. Subtask E is already rated within the indicator measuring U.S. trade/aid financial interdependence of the foreign country. Subtasks A, B, and C confound political reliability considerations with country war zone delimitation and wartime shipping loss, foreign production and trade estimation tasks respectively covered under other submodels within the stockpile supply forecasting system of serial submodels. Shipping loss, war zone and political reliability submodel discounts are applied in a multiplicative fashion to basic Interior materials experts' forecasts of foreign materials supplies.

APPENDIX I

- May 31,1983 letter from M. Bozzelli to Leslie Barr
- Proposed Analytical Procedures to Determine Requirements
- July 5, 1983 response from Leslie Barr

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MAY 31 1983

Ms. Leslie J. Barr, Director
U.S. Department of Commerce
Office of Industrial Resource Administration
Resource Assessment Division
Washington, D.C. 20230

Dear Ms. Barr:

Enclosed is a paper prepared by Larry Salkin of this division on the analytical concepts to be used to determine requirements for the Section 232 machine tools investigation. He has tried to explain the methodology as clearly as possible and to answer beforehand anticipated questions on the procedures and data to be used to estimate requirements for a conventional mobilization.

The purposes of the paper are threefold: (1) to make a matter of record the various understandings on methodology between our two agencies, (2) to list the information required from Commerce (on the inputs and investment needed by the machine tools industry), and (3) to obtain the endorsement of Commerce on the assumptions and data to be used for the analysis.

Please review the paper. For the investigation to proceed on schedule your comments are needed as soon as possible.

Sincerely,

[redacted]

Mike Bozzelli
Acting Chief
Resources Assessment Division

Enclosure

NP-RP-RA: MB Mike Bozzelli/287-3864/mec/5-26-83

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PAUL K. KRUEGER
ASSISTANT ASSOCIATE DIRECTOR
FOR RESOURCES PREPAREDNESS

5/26/83

5/31/83
DATE

UNITED STATES DEPARTMENT OF COMMERCE
International Trade Administration
Washington, D.C. 20230

5 JUL 1983

Mr. Larry Salkin
Federal Emergency Management Agency
500 C St., S.W.
Washington, D.C. 20472

Dear Larry,

This is to confirm our recent discussion in which we agreed to utilize the approach for generating requirements for the Section 232 machine tool study by the quantitative methodology outlined in the memorandum signed by Mike Bozzelli on May 31, 1983. As you know, we believe that the one weakness of this approach is that it does not adequately address the issue of fungibility of end use among the products. However, we hope to deal with this problem using other analytic methods.

Thank you for your cooperation in trying to meet the tough deadlines established in the schedule for completion of this study.

Sincerely,

Leslie J. Barr
Director
Resource Assessment Division

Section 232 Investigation into Machine Tools

Proposed Analytical Procedures to Determine Requirements

The Resource Assessment Division (RAD) of FEMA has been assigned the task of estimating the requirements for machine tools in the event of a conventional war. This report is a summary of the analytical procedures that RAD is proposing in order to carry out the assignment so that there is mutual agreement and understanding between all members of the investigating task force concerning the mathematical procedures followed and the data and both explicit and underlying assumptions required to develop acceptable estimates of machine tool requirements.

Because machine tools are an investment good that are intended to last for a much longer period than one year, requirements for machine tools during a mobilization are not based upon industries' purchases of inputs for current production, rather, purchases of machine tools would be for the expansion of production capabilities during a period of crisis. Therefore, estimates of machine tool requirements during a mobilization period is dependent on all new investment requirements by all industries in order to deal with the mobilization requirements. Once all new investment requirements are established, than the requirements for machine tools will be determined as a part of the total mix of investments needed to expand production capabilities.

This report must necessarily be somewhat long and detailed in order to anticipate as many questions as possible and to receive an endorsement of the proposed analytical procedures. And to present the proposed procedure, the original data and its analyses, and the explicit and implicit assumptions in the most coherent manner possible, it is necessary to start with a mathematical equation. Each term of the equation and its data source and assumptions will be explained as clearly and simply as possible. In brief, with this equation, output requirements required to meet consumption targets may be calculated; however, embedded in the equation is the term used to calculate new investment. With these values, requirements for machine tools may be estimated. The equation is as follows:

$$q = (I - A)^{-1}[c + K(I - A)^{-1}dc]$$

This is a matrix equation; and, in standard matrix notation, a lower case letter indicates a vector, or a single column of values; a capital letter indicates a matrix, or more than one row and column of values. In the above equation, all matrices are "square", they will have the same number of rows and columns. Now, a definition of each term, its data source, and underlying assumptions:

Summary of Equation Symbols and Definitions

Symbol: q (a vector)
Definition: Total output of each industry,or, physical production expressed as constant dollars; in this case, constant $1972. Since "q" is to the left of the equal (=) sign, it is an estimate of output requirements to satisfy target consumption and investments.

Data Source: None.

Assumptions: A combination of all of the assumptions concerning all the other terms in the equation.

Symbol: $(I - A)^{-1}$ (a matrix)
Definition: This is the total requirements table developed from an input-output table. This term multiplied by a column (vector) of final demand yields total output. In effect, the terms in brackets in the above equation is final demand separated into two distinct parts: 1) new investment, and 2) all other final demand.

Data Source: The A matrix will be derived for the proposed mix of industries based on the 1977 update by the University of Maryland of the BEA 1972 input-output table. To assure consistency with capital flow data developed by Ken Rogers of BIE, the A matrix is based on transactions in $1977 repriced to $1972.

Assumptions: All the known and accepted underlying assumptions of the basic input-output model are also relevant for this analysis: zero price elasticity; no substitutions; and all values represent the physical exchange of goods and services expressed in constant $1972. Also, the input-output table used for this investigation is a "purified commodity-by-commodity" or activity based table; each industry represents a unique category of a good or service irrespective of which industries are producing them.

Symbol: c (vector)
Definitions: As stated previously, this is all of final demand, excluding new investment. Symbolically, $(I-A)^{-1}c$ is equal to total production required to satisfy all of final demand (consumption) except new investment.

Data Sources: The values for the vector "c" actually is all final demand during a preselected baseline period. The baseline final demand vector may be derived from a variety of sources. Usually, RAD uses Chase Econometrics,Inc. forecasts to derive baseline final demand estimates. The data source and the baseline final demand vector must be approved by OIRA, as well as the baseline year; RAD suggests the year 1982. Also, to account for underutilization of initial

manufacturing capacities, it is suggested that the multiplication of the (I-A) matrix by a [redacted]e combination of output estimates for 1982 for nonmanufacturing industries and capacity estimates for 1980 for manufacturing industries form the basis for the benchmark value for "attainable" consumption, (the initial value for "c").

Symbol: K (matrix)
Definition: This is also referred as the capital input-output table. It is based on a table where the industries listed at the columns are the purchasers of investment, while the industries listed for the rows are the producers of investment;this is referred to as a "capital flow table". The entries in the capital flow table are converted into coefficients based on the ratios of capital stock to capacity for each column industry. This matrix multiplied by output calculates the levels of capital stock by capital producing industries needed for given levels of output.

Data Source: Ken Rogers of BIE has supplied RAD with capital flow table for the years 1970 to 1980. These may be adjusted and edited to form the basis for the K matrix to be used for the analysis. The adaptation of these data to a useful form involves a great deal of computer work. Briefly, because these capital flow tables are very cyclical in the relative levels of investment in each category, it is suggested that these tables be averaged to represent a "typical" or "pro forma" investment pattern. Also, these tables must be converted from "purchasers'" prices to "producers'" prices to conform with I-O conventions. It is suggested that RAD use Table C on page 57 of "The Input-Output Structure of the U.S. Economy, 1972" published by BEA, as the basis of the conversion.

Symbol: dc (vector)
Definition: The letter "d" stands for difference, so "dc" stands for the differences in consumption from one period to the next. For our purposes, "dc" indicates the differences in consumption by both the military and civilian economic sectors over the baseline peacetime year for each mobilization period.

Data Source: OIRA will determine the sources of the data, whether it be DoD, FEMA, or any other source. It must be endorsed and approved by OIRA and the Section 232 task force.

Assumptions: It is assumed that the consumption patterns accurately reflect the narrative of the scenario that is accepted and approved for the Section 232 investigation.

Symbol: $K(I-A)^{-1}dc$ (vector)
Definition: This combination of terms computes the new investment that is needed because of changes in consumption (dc).

Assumption: Changes in capital stock are due to additions of new investment. Reductions in capital stock are due to scrapping of capital equipment.

Industry Categories

Attached to this report is the list of input-output industries used for the analysis. There are 68 industrial categories that have been keyed as closely as possible to the column categories in the capital flow tables developed by Ken Rogers. Also attached to this report is the concordance of NIPA investment categories with BEA I-O industries. To conform with the input-output industries, some aggregations and disaggregations are required. The major disaggregation is for metalworking machinery into three distinct industries for machine tools-metalworking; machine tools-metal forming; and machine tool supplies.

Special Note on Definition of I-O Categories

The 1977 updated I-O table is a "purified" table, which is based on a concept developed by Prof. Clopper Almon of the University of Maryland. This is an activity based table; in other words, the industrial categories refer to economic activities that are not performed by any other named category. The SIC industry codes are based on establishments that may be producing a wide variety of goods and services that are also produced by other sectors of the economy. The "purified" table is a rearrangement of all similar economic activities into single and unique economic activities.

Since the capital flow tables developed by Ken Rogers are based on SIC coded establishments, the table of average capital flows, in producers' prices, developed from these data will also be "purified" so that the entries for each industry category will be conformable with the 1977 I-O table, repriced to $1972. This process will require the use of the Make Table for 1972 since such a table based on 1977 is not readily available. This is not a serious problem since it is believed that the pattern of primary and secondary production among SIC establishments did not not change in any significant degree betweeen 1972 and 1977.

Sequence of Procedures to Estimate Demand for Machine Tools for a Conventional Mobilization

The following is a list of procedures in order to estimate the requirements for machine tools for a conventional mobilization. These procedures will not necessarily be performed in the same sequence as is listed, and some ommissions are to be expected.

List of Procedures

1. Calculate average capital flow table from Ken Rogers' data for 1970 to 1980.

2. Arrange the rows of the average table to conform to I-O industry categories. Where applicable, use data provided by John Tucker from industry sources.

3. Arrange the columns of the average table to conform to the I-O industry categories. Again, where applicable, use industry data provided to John Tucker.

4. Transfer the resulting table from NIH to the 1108.

5. Convert the columns of the table from an establishment basis to a commodity basis. The make table for 1972 will be used either directly or by applying the Almon purification technique.

6. Convert the rearranged average table from purchasers' to producers' prices using Table C. on page 57 of the BEA SCB reprint as a guide.

7. This capital flow table in $1972 will be the basis for the capital input-output table (K) to be used in the previously listed equation. Estimates of capital stock compiled by Ken Rogers in constant $1972 will be used for this purpose. These estimates will be aggregated and disaggregated using the same bases as for the capital flow tables.

8. The I-O transactions table for 1977 will be compiled from the 496 industry (commodity) transactions data that will conform to the industry composition of the capital flow tables. This table will be repriced to constant $1972 using deflators provided by the Almon organization.

9. The above table will be converted into an A matrix and the inverse of (I-A) will be calculated for use in the equation.

10. Using the (I-A) inverse, output estimates for 1980 in constant $1972 will be calculated. This involves the calculation of a "bill of goods" for 1980 in constant $1972, probably based on Chase Econometrics data.

11. With output and net capital stock estimates for 1980 in constant $1972, the capital input-output table may be calculated based on the average capital flow table de-

rived from Ken Roger's data. This table (K) will be used to estimate new investment requirements based on changes in consumption patterns from a baseline year due to a conventional mobilization.

12. Machine tool requirements will be estimated directly from this procedure since both types- metal cutting and metal forming- are treated as separate commodities.

List of Attached Tables

1. Input-Output Industries Based on Ken Roger's Capital-Flow Tables (Handwritten and Xerox reduced)

2. Concordance of NIPA Investment Factors with BEA I-O Industries (Handwritten and Xerox reduced)

3. Table C.-Input-Output Commodity Composition of Producers' Durable Equipment Expenditures, in Producers' and Purchasers' Prices,1972
(Xerox copy)

Section 232 Investigation of Machine Tools
Input-output Industries
Based on Kendrick's Capital Flow Table

*	Capital Receiving Industries	BEA Codes	Input Sequence	REGRIP CODE
	Agriculture	1-4	1-19	1
	Iron Ore Mining	5	20	2
	Nonferrous Metal Ore Mining	6	21-22	3-4
	Coal Mining	7	23	5
	Crude Petro & Nat Gas	8	24-29	6-7
	Stone, Clay, Mining & Quarrying	9	25	8
	Chem. Fertilizer, Mineral Mining	10	26	9
	Construction	11-12	27-76	10-12
	Ordnance & Accessories	13	77-82	13-18
	Food & Kindred Products	14	83-126	PC 19
	Tobacco Mfrs	15	127-130	PC 19
	Fabrics, Yarn & Thread Mills	16	131-134	PC 20
	Misc Textile Goods & Floor Covering	17	135-144	PC 20
	Apparel	18	145-151	PC 20
	Misc Fabricated Textile Prod	19	152-159	PC 20
	Lumber & Wood Prod, except Containers	20	160-172	PC 21
	Wooden Containers	21	173	PC 21
*	Furniture & Fixtures	22-23	174-186	22-23
	Paper & Allied Prod	24	187-198	PC 24
	Paperboard Containers & Boxes	25	199	PC 24
	Printing & Publishing	26	200-214	25
	Chemical & Allied Prod	27	215-224	PC 26 & 27
	Plastics & Synthetics Mat	28	225-228	PC 26 & 28
	Drugs, Cleaning & Toilet Prep	29	229-233	PC 26 & 28
	Paints and Allied Prod	30	234	PC 26 & 28
	Petroleum Refining	31	235-237	29-30
	Rubber & Misc Plastics Prod	32	238-243	31-32
	Leather Tanning	33	244	PC 32
	Footwear & Leather Leather Prod	34	245-252	PC 32
	Glass & Glass Products	35	253-254	PC 34
	Stone & Clay Prod	36	255-277	PC 34
	Primary Iron & Steel	37	278-286	35-39
	Primary Nfrm Nonf Mfg	38	287-300	40-53
*	Fabricated Metal Products	39-42	301-327	54-59
*	Engines & Turbines	43	328-329	60
*	Farm Mach & Equip	44	330-331	61
*	Construction Mine & Oil Eq	45	332-334	PC 62
*	Materials Handling Industrial Eq	46 & 48	335-338	PC 62 & 64
*	Machine Tools Metal Cutting	pt 47.01	339	PC 63
*	" " Forming	47.02	340	PC 63
*	Spec Ind Tools & Ind Tool Access	47.03	341	PC 63
*	Mtl Work & Eq - Gen	pt 47	342-344	PC 64
*	Gen Mach & Mach Shop Prod	49-50	345-359	65-68
*	Office, Computing & Acct Mach	51	360-364	69
*	Service Industry Mach	52	365-369	70
*	Elec Transmission Eq	53	370-377	72-74
*	Misc Elec Eq	54-55	378-387	74-75 & 86

Concordance of NIPA Investment Factors with BEA I-O Industries

	Bureau Capital Flow Tables	BEA 2-Digit Codes		Interim 496 Ind Seq Codes	Ken Rogers Column Industries	
Total All Structures	59	11-12		27-76	11	
Furniture & Fixtures	1	22-23	Aggregate	174-186		
Fabricated Metal Products	2	39-42	Aggregate	301-327		
Engines & Turbines	3	43		328-329		
Tractors }	4	44		330-331		
Agric. Mach. exc. Tractors }	5					
Construction Mach. exc. Truck }	6	45		332-334		
Mining & Oilfield Mach. }	7					
Metalworking Machinery	8	47.01	Disaggregate Capital Flow Table Disagg.	339		
		47.02		340		
		47.03		341		
Rest of Metalworking Machinery	8	47.0401-.0410		342-344 335-338		
Sp. Industrial Machinery	9	46 & 48		345-350		
General Ind. Mach.	10	49-50		351-359		
Office, Computing & Acct Mach.	11	51		360-364		
Service Industry Mach.	12	52		365-369		
Elec. Transmission & Dist. Eq.	13	53		370-377		
Communication Eq.	14	56		388-391		
Other Elec. Eq.	15	54-55; 57-58	Aggregate	378-387 392-399		
Trucks, Buses, Trailers etc. }	16	59	Aggregate	400-403		
Autos }	17					
Aircraft	18	60		404-406		
Ships & Boats	19	61.01-.61.02	Disaggregate Capital Flow Columns	407-408	410 Mobile Homes in different industry	
Railroad Eq.	20	61.03		409	411-413 Separate Industry	
Instruments }	21	62-63	Aggregate	414-423		
Other }	22					

Table D.—Comparable Imports of Machinery and Equipment Expenditures, in Producers' and Purchasers' Prices, [illegible]

[Millions of dollars]

I-O commodity number	Producers' prices	Transportation	Trade	Purchasers' prices
1. Furniture and fixtures				
Total	2,962.8	76.7	362.1	3,392.3
28	269.7	5.2	36.4	311.4
29	2,687.8	66.4	290.7	2,744.9
31	5.0		29.0	34.0
2. Fabricated metal products				
Total	2,305.5	42.7	171.7	2,519.9
6	199.6	5.1	4.8	211.5
27	164.2			164.2
28	2.1			2.1
29	12.0	.6	1.0	14.6
30	1,155.6	16.1	87.5	1,273.2
31	773.2	14.9	169.4	958.5
48	36.8			32.8
51	−4.0			−4.0
3. Engines and turbines				
Total	1,805.3	36.8	52.2	1,895.3
46	1,805.3	36.8	52.2	1,895.3
4. Tractors				
Total	1,911.3	41.6	385.8	2,338.6
44	1,609.7	36.2	197.4	1,840.4
45	304.1	5.1	51.5	360.7
28	2.4	.2		2.6
31	−2.0		76.9	74.9
5. Agricultural machinery (except tractors)				
Total	2,151.7	66.7	305.9	2,523.3
44	2,151.7	66.7	272.9	2,530.3
51			3.0	3.0
6. Construction machinery				
Total	2,334.2	38.9	332.2	2,662.2
45	2,344.2	38.9	422.4	2,662.5
51	−10.0		89.8	89.8
7. Mining and oilfield machinery				
Total	899.9	34.2	78.6	982.7
5	32.4			32.4
45	725.2	28.9	61.5	820.6
49	22.2	.4	3.1	25.7
51			14.0	14.0
8. Metalworking machinery				
Total	3,988.4	21.9	205.4	4,216.7
47	3,971.4	21.9	202.5	4,192.8
51	−16.0		22.9	23.9
9. Special industry machinery, n.e.c.				
Total	4,322.6	36.9	204.8	4,534.8
48	4,337.0	36.9	204.8	4,538.8
51	−5.0			−5.0
10. General industrial, including materials handling, equipment				
Total	3,753.1	102.2	324.6	4,179.9
46	1,640.5	65.4	90.5	1,799.4
49	2,167.5	32.8	234.1	2,415.4
51	−34.9			−34.9
11. Office, computing, and accounting machinery				
Total	4,302.6	37.1	573.4	4,914.1
51	4,323.2	37.1	511.5	4,871.8
51	−19.6		61.9	42.3
12. Service industry machinery				
Total	2,287.7	28.1	469.4	2,786.2
30	32.6	6.9	4.2	43.7
52	2,077.9	21.2	382.3	2,482.1
72	191.5			191.5
51			82.9	82.9
13. Electrical transmission, distribution, and industrial apparatus				
Total	3,314.6	47.1	232.7	3,595.4
39	3,309.8	47.1	216.9	3,573.6
51	5.0		105.8	111.8
14. Communication equipment				
Total	4,791.7	22.8	169.9	4,833.6
13	80.1			80.1
38	64.0	1.0	2.7	67.7
39	4,373.0	20.9	105.2	4,501.8
57	14.4	.1	.3	14.8
69	2,167.2			2,167.2
51	1.0			1.0
15. Electrical equipment, n.e.c.				
Total	730.7	18.9	212.2	942.8
34	214.6	4.0	40.9	259.5
55	82.2	.8	11.6	94.6
69	413.9	14.1	160.7	588.7
16. Trucks, buses, and truck trailers				
Total	8,262.5	197.1	1,353.4	9,813.0
59	8,460.1	197.1	1,303.5	9,960.7
51	−97.6		49.9	−37.7
17. Passenger cars				
Total	5,318.3	222.7	1,665.9	7,206.9
59	5,214.3	222.7	1,816.9	10,253.9
51	−2,896.0		150.0	−2,757.0
18. Aircraft				
Total	1,830.7	2.8	80.9	1,914.4
60	1,980.5	2.0	62.8	2,045.3
62	207.9	.8	18.1	226.8
51	−357.7			−357.7
19. Ships and boats				
Total	1,068.1	.6	12.9	1,101.6
61	1,144.6	.6	12.9	1,158.1
51	−56.5			−56.5
20. Railroad equipment				
Total	1,473.8	30.9	33.8	1,537.8
61	1,491.4	30.0	33.5	1,554.9
51	−17.9			−17.9
21. Instruments				
Total	3,989.2	32.5	786.8	4,798.5
62	1,911.7	7.1	398.9	2,317.7
63	2,074.5	18.4	384.9	2,477.8
51	3.0			3.0
22. Miscellaneous equipment				
Total	1,995.4	53.9	473.4	2,438.7
17	247.2	6.9	33.6	287.7
20	4.8	.1	.3	5.2
22	41.5	1.6	4.3	47.4
44	613.3	7.6	140.2	761.1
61	288.9	4.3	100.5	394.7
64	795.7	33.4	170.7	999.8
20	2.2			2.2
51	.8		23.8	30.6
23. Servo				
Total	−445.0			−445.0
51	−445.0			−445.0
24. Residential (landlord durables)				
Total	1,208.6	46.6	198.9	1,538.1
17	208.5	10.1	48.8	417.4
22	110.2	.8	5.8	116.9
23	2.7		.3	3.0
54	780.6	35.1	128.8	954.3
55	26.6	.8	7.2	64.3
Total PDE	68,315.4	1,304.1	9,208.6	78,828.1

Commodity number	Foreign port value	Transportation	I
Total	60,386	2,653	
1	240	4	
2	853	20	
3	1,091	52	
4	2	0	
5	503	113	
6	372	38	
7	1	0	
8	2,417	288	
9	157	22	
10	78	12	
13	72	1	
14	4,354	185	
15	56	2	
16	722	28	
17	808	52	
18	1,994	110	
19	107	10	
20	1,897	88	
21	4	0	
22	154	17	
23	125	1	
24	1,746	30	
25	6	(*)	
26	225	8	
27	1,247	42	
28	280	13	
29	290	8	
30	2	0	
31	2,427	397	
32	1,008	73	
33	142	7	
34	891	73	
35	271	24	
36	541	31	
37	3,083	221	
38	2,512	32	
39	15	(*)	
40	137	3	
41	220	6	
42	796	20	
43	228	11	
44	699	28	
45	180	9	
46	115	8	
47	256	12	
48	791	31	
49	474	32	
50	7	(*)	
51	88	16	
52	70	3	
53	467	20	
54	451	27	
55	123	3	
56	2,308	67	
57	533	9	
58	293	10	
59	8,057	205	
60	340	2	
61	1,341	54	
62	403	9	
63	540	15	
64	1,544	68	
65	3,806	0	
66	414	(*)	
70	261	0	
73	10	1	
76	12	0	
77	36	0	
81	1,112	15	
83	3,521	0	

*Less than $500,000

analyzed are in foreign port value and in the I–O classification.

It should be noted that the dollar values of transportation and insurance (I–O's 65 and 70) in table D differ from those in column 95 of table 1. The entry (in millions of dollars) for transportation in table 1 (−1,152) equals the table D (2,653) less the row value for I–0 65 in table D (3,806). The column total for transportation in table D consists of the cost of transportation of imported goods by foreign and domestic carriers, whereas the row entry for I–0 65 consists of such costs by foreign carriers plus costs for transporting U.S. residents and their personal goods on foreign carriers. Simila value in table 1 (- column total for insu (96) less the row, val table D (261). The e table 1 is positive a column total for duty Total imports (−76,1 of table 1) are equal of total foreign port the first column of ta noncomparable impo row 80, column 95 of

APPENDIX II

Supporting Tables Listing Changes in Stocks of Machine Tools During a Conventional Mobilization

All Values are in Constant $1983

Metal Cutting Machine Tools:

- Table 1: No Surge in 1980 Capacity Levels
- Table 2: Maximum 20% Surge in 1980 Capacity Levels
- Table 3: Maximum 40% Surge in 1980 Capacity Levels

Metal Forming Machine Tools:

- Table 4: No Surge in 1980 Capacity Levels
- Table 5: Maximum 20% Surge in 1980 Capacity Levels
- Table 6: Maximun 40% Surge in 1980 Capacity levels
- Table 7: Metal Cutting Machine Tools:
  Experiment Based on Zero Level of PCE
  No Surge in 1980 Capaity Levels

SECTION 232 INVESTIGATION INTO MACHINE TOOLS

TABLE 1: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON NO SURGE IN 1980 CAPACITY LEVELS (MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
1	AGRICULTURE	705.6	126.2	-10.1	9.4	-9.4	7.6	12.0	6.9	5.7	118.6	-22.0	2.5	-15.1
2	IRN&FRRALLYS MIN.	2.8	100.7	23.9	-1.6	-2.8	17.0	22.0	12.6	9.1	83.7	1.9	-14.2	-12.0
3	NFERRS MTL ORES MIN	9.1	4.7	4.7	1.3	0.3	2.5	4.1	2.5	1.9	2.2	0.6	-1.3	-1.6
4	COAL MINING	40.9	5.0	2.8	1.6	0.6	2.5	3.8	2.2	1.9	2.5	-0.9	-0.6	-1.3
5	CRUDE PET & NAT GA	1.3	0.9	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.9	-0.3	-0.3	0.0
6	STONE,CLAY MIN,ETC	13.2	2.8	0.9	0.0	0.0	0.9	1.6	0.9	0.6	1.9	-0.6	-0.9	-0.6
7	CHM,FRTLZR MINRALS	6.9	2.2	1.6	0.9	0.6	0.9	1.9	1.3	0.9	1.3	-0.3	-0.3	-0.3
8	CONSTRUCTION	389.8	11.3	6.0	4.1	1.3	7.9	16.0	9.8	8.5	3.5	-10.1	-5.7	-7.2
9	ORDNANCE & ACCESS.	591.4	299.8	1345.2	882.1	515.0	258.9	1347.1	874.9	520.0	40.9	-1.9	7.2	-5.0
10	FOOD,KINDRED PRD.	212.0	6.9	0.0	0.3	-0.9	1.6	2.5	1.3	0.9	5.3	-2.5	-0.9	-1.9
11	TOBACCO MFRS.	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	FABRCS,YARN,THREAD	47.8	6.0	0.3	-0.3	0.0	1.3	1.9	0.9	0.9	4.7	-1.6	-1.3	-0.9
13	MSC TXTLS,FLR COV	12.6	0.6	0.3	0.3	0.0	0.6	0.6	0.3	0.3	0.0	-0.3	0.0	-0.3
14	APPAREL	30.2	0.3	0.3	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	-0.3	-0.3
15	OTH MSC TXTL PRD	11.0	0.3	0.3	0.3	0.0	0.6	0.9	0.3	0.3	-0.3	-0.6	0.0	-0.3
16	LUMBER,WOOD PRD.	274.6	17.6	12.6	5.0	2.5	12.6	17.9	10.7	8.2	5.0	-5.3	-5.7	-5.7
17	WOODEN CONTAINERS	4.4	1.3	1.9	1.3	0.6	0.9	1.9	1.3	0.9	0.3	0.0	0.0	-0.3
18	FURNTR & FIXTRS	229.0	7.2	6.9	2.5	2.2	6.6	8.8	3.8	3.5	0.6	-1.9	-1.3	-1.3
19	PAPER,ALLIED PRD.	169.9	23.0	13.2	2.8	-0.9	9.1	14.5	9.1	6.9	13.8	-1.3	-6.3	-7.9
20	PPRBRD CNTNRS,BOXE	67.0	6.9	4.4	1.9	0.3	3.5	5.7	3.1	2.5	3.5	-1.3	-1.3	-2.2
21	PRINTING,PUBLISHIN	58.5	7.6	4.7	3.8	1.9	4.4	6.6	4.4	3.1	3.1	-1.9	-0.6	-1.3
22	CHEM. & ALLIED PRD	307.4	118.6	101.0	60.7	29.3	58.2	113.3	81.2	48.8	60.4	-12.3	-20.4	-19.5
23	PLASTICS,SYN.MTRLS	40.6	7.2	3.5	0.9	0.6	3.5	5.0	2.8	2.2	3.8	-1.6	-1.9	-1.6
24	DRUGS,CLEANNG,ETC.	40.6	0.6	0.0	0.3	0.0	0.3	0.6	0.0	0.3	0.3	-0.6	0.3	-0.3
25	PAINTS,ALLIED PRD.	4.1	0.3	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	-0.3
26	PETRO. REFINING	125.2	14.8	11.0	6.9	2.8	8.2	14.2	10.1	7.2	6.6	-3.1	-3.1	-4.4
27	RUBBER,MSC.PLSTCS	441.4	61.0	33.3	5.3	0.6	29.6	46.2	25.8	20.8	31.5	-12.9	-20.4	-20.1
28	LEATHER TANNING	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	FOOTWEAR,OTH. PRD.	10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	GLASS & PRODUCTS	84.6	8.2	5.3	2.2	0.9	5.0	6.6	3.5	2.8	3.1	-1.3	-1.3	-1.9
31	STONE & CLAY PRD.	184.7	12.6	8.8	4.4	1.9	7.9	12.6	7.6	6.0	4.7	-3.8	-3.1	-4.1
32	PRIM. IRON&STEEL	1990.5	1133.2	526.6	194.1	67.6	432.6	555.6	315.9	229.3	700.6	-28.9	-121.8	-161.7
33	PRIM. NFERRS MTLS.	838.4	290.4	362.1	146.0	78.3	228.1	356.4	217.1	158.2	62.3	5.7	-71.1	-79.9
34	FBRCTD. MTL. PRD.	6196.0	632.7	515.3	247.9	131.8	544.6	765.1	432.3	335.7	88.1	-249.8	-184.4	-203.9
35	ENGINES&TURBINES	459.9	52.5	62.9	24.9	0.0	69.2	69.5	38.1	28.9	-16.7	-6.6	-13.2	-28.9
36	FARM MACH.,EQUIP.	1012.4	14.8	2.5	2.5	0.6	6.3	12.0	5.7	5.0	8.5	-9.4	-3.1	-4.4
37	CNSTCTN,MIN,OIL EQ	1742.9	536.7	101.0	33.3	-146.0	79.0	115.1	57.9	44.0	457.7	-14.2	-24.5	-190.0
38	MTRL HNDLNG,SP.IND	1902.1	141.6	151.0	33.0	-151.0	76.8	112.6	68.9	45.9	64.8	38.4	-35.9	-196.9
39	MACH.TOOLS-CUTTING	997.0	457.7	151.0	52.9	-116.7	60.4	78.7	41.8	33.0	397.3	72.4	11.0	-149.7
40	MACH.TOOLS-FORMING	413.4	342.9	58.2	24.5	-57.3	28.0	33.7	17.3	13.2	314.9	24.5	7.2	-70.5
41	SP.DIES,TOOLS,ETC.	1948.3	1469.5	566.3	328.8	-35.5	309.3	483.5	305.5	223.1	1160.2	82.7	23.3	-258.6
42	MTL.MACH-POWER TLS	772.3	13.2	9.8	5.3	2.8	22.0	28.0	14.8	11.3	-8.8	-18.2	-9.4	-8.5
43	GEN. MACH,SHOP PRD	5689.9	1037.2	1010.8	636.8	169.3	852.9	1179.1	765.7	561.9	184.4	-168.3	-129.0	-392.6
44	COMPUTERS, ETC.	538.9	246.0	36.8	8.5	-56.3	26.4	34.0	20.1	16.4	219.6	2.8	-11.6	-72.7
45	SERVICE IND. MACH.	645.2	37.1	40.0	12.9	0.6	24.2	33.7	17.6	14.2	12.9	6.3	-4.7	-13.5

SECTION 232 INVESTIGATION INTO MACHINE TOOLS
TABLE 1: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION
ESTIMATES ARE BASED ON NO SURGE IN 1980 CAPACITY LEVELS
(MILLIONS $1983)

		TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
SEQ	INDUSTRY NAME	STOCK	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
46	ELEC. TRNSMSSN EQ.	1274.4	457.4	269.0	115.8	-18.2	209.5	252.0	143.8	111.4	247.9	17.0	-28.0	-129.6
47	OTH ELEC. EQ.	2435.9	828.3	637.1	97.5	100.0	545.8	783.7	378.8	319.6	282.5	-146.6	-281.3	-219.6
48	COMMUNICATION EQ.	1023.4	1247.1	1247.4	430.7	370.3	857.9	1259.7	543.0	477.6	389.2	-12.3	-112.3	-107.3
49	MOTOR VEHICLES	4871.0	111.7	124.6	55.1	39.6	148.5	341.0	121.1	122.7	-36.8	-216.4	-66.1	-83.1
50	AIRCRAFT	3947.6	3709.8	5792.7	4860.6	3637.1	3225.9	5663.1	4983.6	3956.1	483.9	129.6	-123.0	-319.0
51	SHIPS & BOATS	414.0	433.2	443.6	229.0	134.6	575.4	436.4	224.3	147.2	-142.2	7.2	4.7	-12.6
52	RAILROAD EQUIP.	223.1	62.3	13.8	12.6	-20.8	3.5	6.6	4.4	2.8	58.8	7.2	8.2	-23.6
53	OTHR. TRNSPTTN EQ.	80.2	32.7	-0.3	-30.5	0.3	1.9	3.8	1.6	1.3	30.8	-4.1	-32.1	-0.9
54	INSTRMNTS,OPTCL GD	1702.6	611.3	259.2	210.8	-84.9	237.2	346.1	225.9	167.7	374.1	-86.8	-15.1	-252.6
55	MISC. MFG.	615.0	18.9	10.1	8.2	2.8	15.1	22.0	14.5	10.4	3.8	-12.0	-6.3	-7.6
56	TRANSPORTATION	610.6	93.8	141.9	100.0	48.4	86.8	168.3	115.8	75.8	6.9	-26.4	-15.7	-27.4
57	COMMUNICATIONS	14.2	2.8	1.3	0.9	0.0	0.9	1.6	0.9	0.6	1.9	-0.3	0.0	-0.6
58	RADIO,TV BRDCSTNG	2.2	0.6	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	-0.3
59	PUBLIC UTILITIES	365.6	40.9	24.9	14.5	5.3	21.1	32.4	21.4	15.7	19.8	-7.6	-6.9	-10.4
60	TRADE	478.5	69.2	2.2	-0.9	-11.6	16.0	26.1	16.4	12.3	53.2	-23.9	-17.3	-23.9
61	FINANCE,INSURNCE	23.0	0.9	0.6	0.9	0.6	0.6	0.9	0.6	0.3	0.3	-0.3	0.3	0.3
62	REAL ESTATE,RENTLS	11.0	0.6	0.3	0.0	0.0	0.3	0.3	0.3	0.0	0.3	0.0	-0.3	0.0
63	HOTELS,PERS REPRS	248.2	25.8	23.6	29.6	13.5	22.0	37.1	23.6	16.7	3.8	-13.5	6.0	-3.1
64	BUSNESS SRVCS,R&D	220.5	48.8	31.8	24.2	12.3	26.7	40.3	26.7	19.5	22.0	-8.5	-2.5	-7.2
65	AUTO REPAIRS	459.9	99.7	119.2	54.4	39.3	16.0	27.4	17.6	13.2	83.7	91.9	36.8	26.1
66	AMUSEMENTS	64.2	9.1	-5.3	0.9	0.3	1.6	2.2	1.6	1.6	7.6	-7.6	-0.6	-1.3
67	MED,EDUC,NONPROFIT	103.2	10.4	-8.8	5.3	-4.7	1.3	0.9	0.6	0.6	9.1	-9.8	4.7	-5.3
68	MISC. ECON. SECTOR	5724.8	164.2	123.6	70.5	28.0	172.1	391.4	518.1	338.2	-7.9	-267.7	-447.7	-310.2
	STOCKS AND NET CHANGES	54187.3	15339.9	14430.4	9038.8	4728.1	9399.0	15369.8	10781.7	8196.9	5940.9	-939.4	-1742.9	-3468.8

SECTION 232 INVESTIGATION INTO MACHINE TOOLS
TABLE 2: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION
ESTIMATES ARE BASED ON MAXIMUM 20% SURGE IN 1980 CAPACITY LEVELS
(MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK*	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
1	AGRICULTURE	705.6	250.7	-10.4	10.1	-9.1	7.6	12.0	6.9	5.7	243.2	-22.3	3.1	-14.8
2	IRN&FRRALLYS MIN.	2.8	116.7	23.3	-0.9	-2.2	17.0	22.0	12.6	9.1	99.7	1.3	-13.5	-11.3
3	NFRRS NTL ORES MIN	9.1	6.0	4.4	1.3	0.3	2.5	4.1	2.5	1.9	3.5	0.3	-1.3	-1.6
4	COAL MINING	40.9	6.3	2.8	1.6	0.6	2.5	3.8	2.2	1.9	3.8	-0.9	-0.6	-1.3
5	CRUDE PET & NAT GA	1.3	1.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	1.3	-0.3	-0.3	0.0
6	STONE,CLAY MIN,ETC	13.2	4.7	0.9	0.3	0.0	0.9	1.6	0.9	0.6	3.8	-0.6	-0.6	-0.6
7	CHM,FRTLZR MINRALS	6.9	2.5	1.6	0.6	0.3	0.9	1.9	1.3	0.9	1.6	-0.3	-0.6	-0.6
8	CONSTRUCTION	389.8	14.2	5.7	4.4	1.6	7.9	16.0	9.8	8.5	6.3	-10.4	-5.3	-6.9
9	ORDNANCE & ACCESS.	709.7	181.5	1345.2	882.1	515.0	156.7	1347.1	874.9	520.0	24.9	-1.9	7.2	-5.0
10	FOOD,KINDRED PRD.	255.1	10.1	0.0	0.6	-0.9	1.6	2.5	1.3	0.9	8.5	-2.5	-0.6	-1.9
11	TOBACCO MFRS.	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	FABRCS,YARN,THREAD	57.6	6.0	0.3	0.0	0.0	1.3	1.9	0.9	0.9	4.7	-1.6	-0.9	-0.9
13	MSC TXTLS,FLR COV	15.1	0.6	0.3	0.3	0.0	0.6	0.6	0.3	0.3	0.0	-0.3	0.0	-0.3
14	APPAREL	36.2	0.3	0.3	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	-0.3	-0.3
15	OTH MSC TXTL PRD	12.9	0.3	0.3	0.3	0.0	0.6	0.9	0.3	0.3	-0.3	-0.6	0.0	-0.3
16	LUMBER,WOOD PRD.	329.4	17.6	12.0	6.3	3.1	12.6	17.9	10.7	8.2	5.0	-6.0	-4.4	-5.0
17	WOODEN CONTAINERS	5.3	0.9	1.6	1.3	0.6	0.9	1.9	1.3	0.9	0.0	-0.3	0.0	-0.3
18	FURNTR & FIXTRS	275.0	6.3	6.9	2.8	2.2	6.6	8.8	3.8	3.5	-0.3	-1.9	-0.9	-1.3
19	PAPER,ALLIED PRD.	203.9	20.4	9.4	6.9	2.5	9.1	14.5	9.1	6.9	11.3	-5.0	-2.2	-4.4
20	PPRBRD CNTNRS,BOXE	80.2	6.6	3.8	2.2	0.9	3.5	5.7	3.1	2.5	3.1	-1.9	-0.9	-1.6
21	PRINTING,PUBLISHIN	70.2	10.1	4.7	3.8	1.9	4.4	6.6	4.4	3.1	5.7	-1.9	-0.6	-1.3
22	CHEM. & ALLIED PRD	368.7	103.8	99.7	62.9	30.8	58.2	113.3	81.2	48.8	45.6	-13.5	-18.2	-17.9
23	PLASTICS,SYN.MTRLS	43.4	10.7	3.5	1.6	0.9	3.5	5.0	2.8	2.2	7.2	-1.6	-1.3	-1.3
24	DRUGS,CLEANNG,ETC.	48.8	0.6	0.0	0.3	0.0	0.3	0.6	0.0	0.3	0.3	-0.6	0.3	-0.3
25	PAINTS,ALLIED PRD.	4.7	0.3	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	-0.3
26	PETRO. REFINING	149.4	17.0	10.7	7.2	3.1	8.2	14.2	10.1	7.2	8.8	-3.5	-2.8	-4.1
27	RUBBER,MSC.PLSTCS	529.5	42.5	28.9	17.6	6.3	29.6	46.2	25.8	20.8	12.9	-17.3	-8.2	-14.5
28	LEATHER TANNING	3.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
29	FOOTWEAR,OTH. PRD.	12.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	GLASS & PRODUCTS	93.1	7.6	5.0	2.8	1.3	5.0	6.6	3.5	2.8	2.5	-1.6	-0.6	-1.6
31	STONE & CLAY PRD.	221.5	13.5	8.5	4.7	2.2	7.9	12.6	7.6	6.0	5.7	-4.1	-2.8	-3.8
32	PRIM. IRON&STEEL	1990.5	1541.9	508.1	207.0	86.2	432.6	555.6	315.9	229.3	1109.3	-47.5	-108.9	-143.1
33	PRIM. NFRRS MTLS.	838.4	398.0	354.6	155.4	85.6	228.1	356.4	217.1	158.2	169.9	-1.9	-61.7	-72.7
34	FBRCTD. MTL. PRD.	7435.3	583.9	499.3	276.2	147.5	544.6	765.1	432.3	335.7	39.3	-265.8	-156.0	-188.1
35	ENGINES&TURBINES	552.1	48.8	40.6	21.7	9.1	69.2	69.5	38.1	28.9	-20.4	-28.9	-16.4	-19.8
36	FARM MACH.,EQUIP.	1215.0	25.2	2.5	2.8	0.6	6.3	12.0	5.7	5.0	18.9	-9.4	-2.8	-4.4
37	CNSTCTN,MIN,OIL EQ	2091.5	205.4	100.4	34.0	-145.7	79.0	115.1	57.9	44.0	126.5	-14.8	-23.9	-189.7
38	MTRL HNDLNG,SP.IND	2282.4	54.7	35.2	20.1	9.8	76.8	112.6	68.9	45.9	-22.0	-77.4	-48.8	-36.2
39	MACH.TOOLS-CUTTING	1196.7	276.5	149.7	52.5	-115.5	60.4	78.7	41.8	33.0	216.1	71.1	10.7	-148.5
40	MACH.TOOLS-FORMING	496.1	271.8	58.2	24.9	-57.3	28.0	33.7	17.3	13.2	243.8	24.5	7.6	-70.5
41	SP.DIES,TOOLS,ETC.	2337.8	1231.3	553.7	336.3	-23.0	309.3	483.5	305.5	223.1	922.1	70.2	30.8	-246.0
42	MTL.MACH-POWER TLS	926.8	15.1	9.4	5.7	3.1	22.0	28.0	14.8	11.3	-6.9	-18.6	-9.1	-8.2
43	GEN. MACH,SHOP PRD	6827.8	954.5	883.1	559.4	302.3	852.9	1179.1	765.7	561.9	101.6	-296.0	-206.4	-259.5
44	COMPUTERS, ETC.	646.5	138.7	36.5	8.5	-56.3	26.4	34.0	20.1	16.4	112.3	2.5	-11.6	-72.7
45	SERVICE IND. MACH.	774.2	36.8	31.5	16.0	9.8	24.2	33.7	17.6	14.2	12.6	-2.2	-1.6	-4.4

SECTION 232 INVESTIGATION INTO MACHINE TOOLS
TABLE 2: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION
ESTIMATES ARE BASED ON MAXIMUM 20% SURGE IN 1980 CAPACITY LEVELS
(MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK*	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
46	ELEC. TRNSMSSN EQ.	1529.3	274.3	260.8	119.9	-9.1	209.5	252.0	143.8	111.4	64.8	8.8	-23.9	-120.5
47	OTH ELEC. EQ.	2923.3	479.1	567.9	256.4	169.6	545.8	783.7	378.8	319.6	-66.7	-215.8	-122.4	-150.1
48	COMMUNICATION EQ.	1228.2	1048.2	1247.4	431.0	370.3	857.9	1259.7	543.0	477.6	190.3	-12.3	-112.0	-107.3
49	MOTOR VEHICLES	5845.0	126.8	124.0	57.9	40.3	148.5	341.0	121.1	122.7	-21.7	-217.1	-63.2	-82.4
50	AIRCRAFT	4736.9	2930.8	5792.4	4860.9	3637.4	3225.9	5663.1	4983.6	3956.1	-295.1	129.3	-122.7	-318.7
51	SHIPS & BOATS	414.0	435.7	443.3	229.0	135.0	575.4	436.4	224.3	147.2	-139.7	6.9	4.7	-12.3
52	RAILROAD EQUIP.	267.7	19.8	13.8	12.6	-20.8	3.5	6.6	4.4	2.8	16.4	7.2	8.2	-23.6
53	OTHR. TRNSPTTN EQ.	96.3	17.3	-0.3	-14.5	0.3	1.9	3.8	1.6	1.3	15.4	-4.1	-16.0	-0.9
54	INSTRMNTS,OPTCL GD	2043.0	301.4	257.7	213.9	-83.1	237.2	346.1	225.9	167.7	64.2	-88.4	-12.0	-250.7
55	MISC. MFG.	738.1	21.1	9.8	8.8	2.8	15.1	22.0	14.5	10.4	6.0	-12.3	-5.7	-7.6
56	TRANSPORTATION	610.6	145.0	140.3	101.9	49.7	86.8	168.3	115.8	75.8	58.2	-28.0	-13.8	-26.1
57	COMMUNICATIONS	14.2	3.5	1.3	0.9	0.0	0.9	1.6	0.9	0.6	2.5	-0.3	0.0	-0.6
58	RADIO,TV BRDCSTNG	2.2	0.6	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	-0.3
59	PUBLIC UTILITIES	365.6	46.6	24.2	15.7	6.0	21.1	32.4	21.4	15.7	25.5	-8.2	-5.7	-9.8
60	TRADE	478.5	85.3	1.6	-0.3	-11.3	16.0	26.1	16.4	12.3	69.2	-24.5	-16.7	-23.6
61	FINANCE,INSURNCE	23.0	1.3	0.6	1.3	0.6	0.6	0.9	0.6	0.3	0.6	-0.3	0.6	0.3
62	REAL ESTATE,RENTLS	11.0	0.6	0.3	0.3	0.0	0.3	0.3	0.3	0.0	0.3	0.0	0.0	0.0
63	HOTELS,PERS REPRS	248.2	31.8	23.6	29.9	13.8	22.0	37.1	23.6	16.7	9.8	-13.5	6.3	-2.8
64	BUSNESS SRVCS,R&D	220.5	66.1	31.5	25.2	12.9	26.7	40.3	26.7	19.5	39.3	-8.8	-1.6	-6.6
65	AUTO REPAIRS	459.9	117.3	118.6	55.1	39.6	16.0	27.4	17.6	13.2	101.3	91.2	37.4	26.4
66	AMUSEMENTS	64.2	9.8	-5.3	0.9	0.6	1.6	2.2	1.6	1.6	8.2	-7.6	-0.6	-0.9
67	MED,EDUC,NONPROFIT	103.2	10.7	-8.8	5.3	-4.7	1.3	0.9	0.6	0.6	9.4	-9.8	4.7	-5.3
68	MISC. ECON. SECTOR	5724.8	189.4	119.5	75.5	32.1	172.1	391.4	518.1	338.2	17.3	-271.8	-442.6	-306.1
STOCKS AND NET CHANGES		62462.0	13004.6	13996.9	9230.1	5200.0	9296.7	15369.8	10781.7	8196.9	3707.9	-1372.9	-1551.6	-2996.9

*NOTE:- THE ENTRIES FOR MANUFACTURING INDUSTRIES IN THE COLUMN LABELLED "INITIAL STOCK" HAVE BEEN INCREASED BY A MAXIMUM OF 20% OVER THE SAME ENTRIES IN TABLE1 IF THE INDUSTRY OPERATES FOR 100 HOURS A WEEK OR LESS

SECTION 232 INVESTIGATION INTO MACHINE TOOLS

TABLE 3: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON MAXIMUM 40% SURGE IN 1980 CAPACITY LEVELS

(MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK*	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
46	ELEC. TRNSMSSN EQ.	1851.7	143.5	149.4	119.5	-6.0	209.5	252.0	143.8	111.4	-66.1	-102.6	-24.2	-117.3
47	OTH ELEC. EQ.	3410.3	369.3	558.4	262.4	170.2	545.8	783.7	378.8	319.6	-176.5	-225.3	-116.4	-149.4
48	COMMUNICATION EQ.	1432.7	849.1	1247.1	431.0	370.3	857.9	1259.7	543.0	477.6	-8.8	-12.6	-112.0	-107.3
49	MOTOR VEHICLES	6819.3	143.8	123.0	60.1	41.2	148.5	341.0	121.1	122.7	-4.7	-218.0	-61.0	-81.5
50	AIRCRAFT	5526.6	2150.9	5792.4	4860.9	3637.4	3225.9	5663.1	4983.6	3956.1	-1075.0	129.3	-122.7	-318
51	SHIPS & BOATS	414.0	438.2	443.3	229.0	135.0	575.4	436.4	224.3	147.2	-137.2	6.9	4.7	-12.
52	RAILROAD EQUIP.	312.1	8.8	5.3	3.8	1.9	3.5	6.6	4.4	2.8	5.3	-1.3	-0.6	-0.9
53	OTHR. TRNSPTTN EQ.	112.3	1.6	0.3	0.6	0.3	1.9	3.8	1.6	1.3	-0.3	-3.5	-0.9	-0.9
54	INSTRMNTS,OPTCL GD	2383.4	94.4	157.3	213.9	-83.1	237.2	346.1	225.9	167.7	-142.8	-188.8	-12.0	-250.7
55	MISC. MFG.	861.1	23.9	9.4	9.1	3.1	15.1	22.0	14.5	10.4	8.8	-12.6	-5.3	-7.2
56	TRANSPORTATION	610.6	194.4	139.4	101.6	50.0	86.8	168.3	115.8	75.8	107.6	-28.9	-14.2	-25.8
57	COMMUNICATIONS	14.2	3.8	1.3	0.9	0.0	0.9	1.6	0.9	0.6	2.8	-0.3	0.0	-0.6
58	RADIO,TV BRDCSTNG	2.2	0.9	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.6	0.0	0.0	-0.3
59	PUBLIC UTILITIES	365.6	61.3	18.6	15.4	6.3	21.1	32.4	21.4	15.7	40.3	-13.8	-6.0	-9.4
60	TRADE	478.5	102.2	1.3	-0.3	-11.3	16.0	26.1	16.4	12.3	86.2	-24.9	-16.7	-23.6
61	FINANCE,INSURNCE	23.0	1.6	0.9	1.3	0.6	0.6	0.9	0.6	0.3	0.9	0.0	0.6	0.3
62	REAL ESTATE,RENTLS	11.0	0.9	0.3	0.3	0.0	0.3	0.3	0.3	0.0	0.6	0.0	0.0	0.0
63	HOTELS,PERS REPRS	248.2	38.4	23.3	29.9	13.8	22.0	37.1	23.6	16.7	16.4	-13.8	6.3	-2.8
64	BUSNESS SRVCS,R&D	220.5	84.0	31.1	25.2	12.9	26.7	40.3	26.7	19.5	57.3	-9.1	-1.6	-6.6
65	AUTO REPAIRS	459.9	135.3	118.3	55.1	39.6	16.0	27.4	17.6	13.2	119.2	90.9	37.4	26.4
66	AMUSEMENTS	64.2	10.7	-5.7	0.9	0.6	1.6	2.2	1.6	1.6	9.1	-7.9	-0.6	-0.9
67	MED,EDUC,NONPROFIT	103.2	11.0	-8.8	5.3	-4.7	1.3	0.9	0.6	0.6	9.8	-9.8	4.7	-5.3
68	MISC. ECON. SECTOR	5724.8	230.6	114.8	75.2	32.7	172.1	391.4	518.1	338.2	58.5	-276.5	-443.0	-305.5
STOCKS AND NET CHANGES		70699.8	11773.3	13598.9	9237.6	5451.1	9194.5	15369.8	10781.7	8196.9	2578.8	-1770.9	-1544.1	-2745.8

*NOTE:- THE ENTRIES FOR MANUFACTURING INDUSTRIES IN THE COLUMN LABELLED "INITIAL STOCK" HAVE BEEN INCREASED BY A MAXIMUM OF 40% OVER THE SAME ENTRIES IN TABLE 1 IF THE INDUSTRY OPERATES FOR 120 HOURS A WEEK OR LESS..

SECTION 232 INVESTIGATION INTO MACHINE TOOLS

TABLE 3: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON MAXIMUM 40% SURGE IN 1980 CAPACITY LEVELS (MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK*	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
1	AGRICULTURE	705.6	375.0	-10.7	10.1	-9.1	7.6	12.0	6.9	5.7	367.5	-22.7	3.1	-14.8
2	IRN&FRRALLYS MIN.	2.8	134.6	22.7	-0.9	-1.6	17.0	22.0	12.6	9.1	117.7	0.6	-13.5	-10.7
3	NFRRS MTL ORES MIN	9.1	7.6	4.4	1.6	0.6	2.5	4.1	2.5	1.9	5.0	0.3	-0.9	-1.3
4	COAL MINING	40.9	8.2	2.5	1.6	0.6	2.5	3.8	2.2	1.9	5.7	-1.3	-0.6	-1.3
5	CRUDE PET & NAT GA	1.3	1.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	1.3	-0.3	-0.3	0.0
6	STONE,CLAY MIN,ETC	13.2	6.3	0.6	0.3	0.0	0.9	1.6	0.9	0.6	5.3	-0.9	-0.6	-0.6
7	CHM,FRTLZR MINRALS	6.9	3.8	1.6	0.6	0.3	0.9	1.9	1.3	0.9	2.8	-0.3	-0.6	-0.6
8	CONSTRUCTION	389.8	17.0	5.3	4.4	1.6	7.9	16.0	9.8	8.5	9.1	-10.7	-5.3	-6.9
9	ORDNANCE & ACCESS.	828.0	63.2	1345.2	882.1	515.0	54.4	1347.1	874.9	520.0	8.8	-1.9	7.2	-5.0
10	FOOD,KINDRED PRD.	297.6	13.2	0.0	0.6	-0.9	1.6	2.5	1.3	0.9	11.6	-2.5	-0.6	-1.9
11	TOBACCO MFRS.	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	FABRCS,YARN,THREAD	67.0	6.0	0.3	0.0	0.0	1.3	1.9	0.9	0.9	4.7	-1.6	-0.9	-0.9
13	MSC TXTLS,FLR COV	17.9	0.6	0.3	0.3	0.0	0.6	0.6	0.3	0.3	0.0	-0.3	0.0	-0.3
14	APPAREL	42.5	0.3	0.3	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	-0.3	-0.3
15	OTH MSC TXTL PRD	15.1	0.3	0.3	0.3	0.0	0.6	0.9	0.3	0.3	-0.3	-0.6	0.0	-0.3
16	LUMBER,WOOD PRD.	384.4	19.5	11.6	6.6	3.1	12.6	17.9	10.7	8.2	6.9	-6.3	-4.1	-5.0
17	WOODEN CONTAINERS	6.3	1.3	1.3	1.3	0.6	0.9	1.9	1.3	0.9	0.3	-0.6	0.0	-0.3
18	FURNTR & FIXTRS	320.6	5.3	6.9	2.8	2.2	6.6	8.8	3.8	3.5	-1.3	-1.9	-0.9	-1.3
19	PAPER,ALLIED PRD.	214.9	29.9	12.6	3.5	-0.6	9.1	14.5	9.1	6.9	20.8	-1.9	-5.7	-7.6
20	PPRBRD CNTNRS,BOXE	93.8	7.6	3.8	2.2	0.9	3.5	5.7	3.1	2.5	4.1	-1.9	-0.9	-1.6
21	PRINTING,PUBLISHIN	81.8	12.3	4.7	3.8	1.9	4.4	6.6	4.4	3.1	7.9	-1.9	-0.6	-1.3
22	CHEM. & ALLIED PRD	379.7	139.7	99.1	62.6	30.8	58.2	113.3	81.2	48.8	81.5	-14.2	-18.6	-17.9
23	PLASTICS,SYN.MTRLS	43.4	18.2	3.1	1.6	0.9	3.5	5.0	2.8	2.2	14.8	-1.9	-1.3	-1.3
24	DRUGS,CLEANNG,ETC.	56.9	0.6	0.0	0.3	0.0	0.3	0.6	0.0	0.3	0.3	-0.6	0.3	-0.3
25	PAINTS,ALLIED PRD.	5.7	0.3	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	-0.3
26	PETRO. REFINING	149.4	21.7	10.4	7.2	3.1	8.2	14.2	10.1	7.2	13.5	-3.8	-2.8	-4.1
27	RUBBER,MSC.PLSTCS	617.9	44.7	28.0	17.9	6.6	29.6	46.2	25.8	20.8	15.1	-18.2	-7.9	-14.2
28	LEATHER TANNING	3.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
29	FOOTWEAR,OTH. PRD.	14.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	GLASS & PRODUCTS	93.1	11.3	3.8	0.3	1.3	5.0	6.6	3.5	2.8	6.3	-2.8	-3.1	-1.6
31	STONE & CLAY PRD.	258.3	15.4	8.2	4.7	2.2	7.9	12.6	7.6	6.0	7.6	-4.4	-2.8	-3.8
32	PRIM. IRON&STEEL	1990.5	1997.1	492.0	210.8	102.6	432.6	555.6	315.9	229.3	1564.5	-63.5	-105.1	-126.8
33	PRIM. NFRRS MTLS.	838.4	526.3	347.3	157.0	87.5	228.1	356.4	217.1	158.2	298.2	-9.1	-60.1	-70.8
34	FBRCTD. MTL. PRD.	8674.5	577.3	487.0	288.5	154.2	544.6	765.1	432.3	335.7	32.7	-278.1	-143.8	-181.5
35	ENGINES&TURBINES	644.0	49.4	38.7	21.7	12.3	69.2	69.5	38.1	28.9	-19.8	-30.8	-16.4	-16.7
36	FARM MACH.,EQUIP.	1420.4	35.5	2.5	3.1	0.6	6.3	12.0	5.7	5.0	29.3	-9.4	-2.5	-4.4
37	CNSTCTN,MIN,OIL EQ	2440.0	85.3	25.2	12.9	6.3	79.0	115.1	57.9	44.0	6.3	-90.0	-45.0	-37.8
38	MTRL HNDLNG,SP.IND	2663.1	68.6	34.9	19.5	9.8	76.8	112.6	68.9	45.9	-8.2	-77.7	-49.4	-36.2
39	MACH.TOOLS-CUTTING	1395.9	97.5	149.1	52.5	-114.5	60.4	78.7	41.8	33.0	37.1	70.5	10.7	-147.5
40	MACH.TOOLS-FORMING	578.9	202.0	57.6	24.9	-56.6	28.0	33.7	17.3	13.2	174.0	23.9	7.6	-69.8
41	SP.DIES,TOOLS,ETC.	2727.6	1024.7	543.9	336.6	-14.8	309.3	483.5	305.5	223.1	715.4	60.4	31.1	-237.8
42	MTL.MACH-POWER TLS	1081.3	17.9	9.1	5.7	3.5	22.0	28.0	14.8	11.3	-4.1	-18.9	-9.1	-7.9
43	GEN. MACH,SHOP PRD	7966.0	954.2	856.0	562.2	336.0	852.9	1179.1	765.7	561.9	101.3	-323.1	-203.5	-225.9
44	COMPUTERS, ETC.	754.4	31.8	36.5	8.5	-56.3	26.4	34.0	20.1	16.4	5.3	2.5	-11.6	-72.7
45	SERVICE IND. MACH.	903.5	41.5	31.1	16.0	10.1	24.2	33.7	17.6	14.2	17.3	-2.5	-1.6	-4.1

SECTION 232 INVESTIGATION INTO MACHINE TOOLS

TABLE 4: CHANGES IN STOCKS OF METAL FORMING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON NO SURGE IN 1980 CAPACITY LEVELS

(MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
46	ELEC. TRNSMSSN EQ.	722.4	259.4	152.3	65.7	-10.3	118.7	142.6	81.6	63.0	140.6	9.6	-15.9	-73.3
47	OTH ELEC. EQ.	1547.7	526.4	404.7	62.0	63.7	347.0	497.9	240.8	203.0	179.4	-93.2	-178.8	-139.3
48	COMMUNICATION EQ.	655.8	799.1	799.1	276.0	237.2	549.6	807.0	348.0	305.8	249.4	-8.0	-72.0	-68.7
49	MOTOR VEHICLES	988.8	22.6	25.2	11.3	8.0	30.2	69.3	24.5	24.9	-7.6	-44.1	-13.3	-16.9
50	AIRCRAFT	300.9	282.6	441.5	370.5	277.3	245.8	431.5	379.8	301.5	36.8	10.0	-9.3	-24..
51	SHIPS & BOATS	105.1	110.1	112.8	58.4	34.2	146.3	111.1	57.1	37.5	-36.2	1.7	1.3	-3.3
52	RAILROAD EQUIP.	53.4	14.9	3.3	3.0	-5.0	1.0	1.7	1.0	0.7	13.9	1.7	2.0	-5.6
53	OTHR. TRNSPTTN EQ.	20.6	8.6	0.0	-8.0	0.0	0.3	1.0	0.3	0.3	8.3	-1.0	-8.3	-0.3
54	INSTRMNTS,OPTCL GD	456.8	163.9	69.7	56.7	-22.9	63.7	92.9	60.7	45.1	100.2	-23.2	-4.0	-68.0
55	MISC. MFG.	693.3	21.2	11.3	9.3	3.0	16.9	24.9	16.3	11.6	4.3	-13.6	-7.0	-8.6
56	TRANSPORTATION	228.9	35.2	53.1	37.5	18.2	32.5	63.0	43.5	28.5	2.7	-10.0	-6.0	-10.3
57	COMMUNICATIONS	5.3	1.0	0.3	0.3	0.0	0.3	0.7	0.3	0.3	0.7	-0.3	0.0	-0.3
58	RADIO,TV BRDCSTNG	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
59	PUBLIC UTILITIES	139.0	15.6	9.6	5.6	2.0	8.0	12.3	8.3	6.0	7.6	-2.7	-2.7	-4.0
60	TRADE	179.4	25.9	0.7	-0.3	-4.3	6.0	9.6	6.0	4.6	19.9	-9.0	-6.3	-9.0
61	FINANCE,INSURNCE	8.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.3
62	REAL ESTATE,RENTLS	4.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
63	HOTELS,PERS REPRS	93.2	9.6	9.0	11.3	5.0	8.3	13.9	9.0	6.3	1.3	-5.0	2.3	-1.3
64	BUSNESS SRVCS,R&D	127.7	28.2	18.6	13.9	7.3	15.6	23.2	15.6	11.3	12.6	-4.6	-1.7	-4.0
65	AUTO REPAIRS	179.4	38.8	46.4	21.2	15.3	6.3	10.6	7.0	5.0	32.5	35.8	14.3	10.3
66	AMUSEMENTS	24.2	3.3	-2.0	0.3	0.3	0.7	1.0	0.7	0.7	2.7	-3.0	-0.3	-0.3
67	MED,EDUC,NONPROFIT	38.8	4.0	-3.3	2.0	-1.7	0.3	0.3	0.3	0.3	3.6	-3.6	1.7	-2.0
68	MISC. ECON. SECTOR	3434.1	98.5	74.0	42.5	16.9	103.2	234.8	310.8	203.0	-4.6	-160.9	-268.3	-186.1
STOCKS AND NET CHANGES		22040.1	4886.9	4083.6	1968.6	983.2	2993.6	4699.2	2893.8	2176.6	1893.3	-615.6	-925.1	-1193.5

SECTION 232 INVESTIGATION INTO MACHINE TOOLS
TABLE 4: CHANGES IN STOCKS OF METAL FORMING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON NO SURGE IN 1980 CAPACITY LEVELS
(MILLIONS $1983)

		TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
SEQ	INDUSTRY NAME	STOCK	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
1	AGRICULTURE	264.7	47.4	-3.6	3.6	-3.6	2.7	4.6	2.7	2.0	44.8	-8.3	1.0	-5.6
2	IRN&FRRALLYS MIN.	1.0	37.8	9.0	-0.7	-1.0	6.3	8.3	4.6	3.3	31.5	0.7	-5.3	-4.3
3	NFRRS MTL ORES MIN	3.3	1.7	1.7	0.3	0.0	1.0	1.7	1.0	0.7	0.7	0.0	-0.7	-0.7
4	COAL MINING	15.3	2.0	1.0	0.7	0.3	1.0	1.3	1.0	0.7	1.0	-0.3	-0.3	-0.3
5	CRUDE PET & NAT GA	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
6	STONE,CLAY MIN,ETC	5.0	1.0	0.3	0.0	0.0	0.3	0.7	0.3	0.3	0.7	-0.3	-0.3	-0.3
7	CHM,FRTLZR MINRALS	2.7	0.7	0.7	0.3	0.3	0.3	0.7	0.7	0.3	0.3	0.0	-0.3	-0.3
8	CONSTRUCTION	146.3	4.3	2.3	1.7	0.7	3.0	6.0	3.6	3.0	1.3	-3.6	-2.0	-2.3
9	ORDNANCE & ACCESS.	194.7	98.5	442.5	290.2	169.5	84.9	443.2	287.9	171.2	13.6	-0.7	2.3	-1.7
10	FOOD,KINDRED PRD.	79.6	2.7	0.0	0.3	-0.3	0.7	1.0	0.3	0.3	2.0	-1.0	0.0	-0.7
11	TOBACCO MFRS.	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	FABRCS,YARN,THREAD	17.9	2.3	0.0	0.0	0.0	0.3	0.7	0.3	0.3	2.0	-0.7	-0.3	-0.3
13	MSC TXTLS,FLR COV	5.6	0.3	0.3	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
14	APPAREL	11.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	OTH MSC TXTL PRD	5.3	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	-0.3	-0.3	-0.3	-0.3
16	LUMBER,WOOD PRD.	106.8	7.0	5.0	2.0	1.0	5.0	7.0	4.0	3.0	2.0	-2.0	-2.0	-2.0
17	WOODEN CONTAINERS	1.7	0.3	0.7	0.3	0.3	0.3	0.7	0.7	0.3	0.0	0.0	-0.3	0.0
18	FURNTR & FIXTRS	304.5	9.6	9.3	3.6	3.0	8.6	11.6	5.0	4.6	1.0	-2.3	-1.3	-1.7
19	PAPER,ALLIED PRD.	69.7	9.3	5.3	1.3	-0.3	3.6	6.0	3.6	3.0	5.6	-0.7	-2.3	-3.3
20	PPRBRD CNTNRS,BOXE	31.5	3.3	2.0	1.0	0.3	1.7	2.7	1.3	1.0	1.7	-0.7	-0.3	-0.7
21	PRINTING,PUBLISHIN	38.5	5.0	3.3	2.3	1.3	2.7	4.3	2.7	2.0	2.3	-1.0	-0.3	-0.7
22	CHEM. & ALLIED PRD	123.1	47.4	40.5	24.2	11.6	23.2	45.4	32.5	19.6	24.2	-5.0	-8.3	-8.0
23	PLASTICS,SYN.MTRLS	15.3	2.7	1.3	0.3	0.3	1.3	2.0	1.0	1.0	1.3	-0.7	-0.7	-0.7
24	DRUGS,CLEANNG,ETC.	16.6	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	-0.3	0.0	0.0
25	PAINTS,ALLIED PRD.	2.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	-0.3	0.0	0.0
26	PETRO. REFINING	47.1	5.6	4.0	2.7	1.0	3.0	5.3	3.6	2.7	2.7	-1.3	-1.0	-1.7
27	RUBBER,MSC.PLSTCS	187.4	25.9	14.3	2.3	0.3	12.6	19.6	10.9	9.0	13.3	-5.3	-8.6	-8.6
28	LEATHER TANNING	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	FOOTWEAR,OTH. PRD.	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	GLASS & PRODUCTS	34.8	3.3	2.3	1.0	0.3	2.0	2.7	1.3	1.3	1.3	-0.3	-0.3	-1.0
31	STONE & CLAY PRD.	69.7	4.6	3.3	1.7	0.7	3.0	4.6	3.0	2.3	1.7	-1.3	-1.3	-1.7
32	PRIM. IRON&STEEL	1207.1	687.0	319.4	117.8	41.1	262.4	336.7	191.4	139.0	424.6	-17.2	-73.6	-97.9
33	PRIM. NFRRS MTLS.	464.0	160.9	200.3	80.9	43.5	126.4	197.4	120.1	87.6	34.5	3.0	-39.1	-44.1
34	FBRCTD. MTL. PRD.	6054.5	618.3	503.5	242.1	128.7	532.4	747.7	422.6	328.1	85.9	-244.1	-180.4	-199.4
35	ENGINES&TURBINES	38.1	4.3	5.3	2.0	0.0	5.6	5.6	3.3	2.3	-1.3	-0.3	-1.3	-2.3
36	FARM MACH.,EQUIP.	304.8	4.3	0.7	0.7	0.0	2.0	3.6	1.7	1.7	2.3	-3.0	-1.0	-1.7
37	CNSTCTN,MIN,OIL EQ	288.9	88.9	16.6	5.6	-24.2	13.3	19.2	9.6	7.3	75.6	-2.7	-4.0	-31.5
38	MTRL HNDLNG,SP.IND	154.2	11.6	12.3	2.7	-12.3	6.3	9.3	5.6	3.6	5.3	3.0	-3.0	-15.9
39	MACH.TOOLS-CUTTING	114.4	52.7	17.2	6.0	-13.3	7.0	9.0	5.0	3.6	45.8	8.3	1.0	-16.9
40	MACH.TOOLS-FORMING	48.4	40.1	7.0	3.0	-6.6	3.3	4.0	2.0	1.7	36.8	3.0	1.0	-8.3
41	SP.DIES,TOOLS,ETC.	264.4	199.4	77.0	44.4	-5.0	42.1	65.7	41.5	30.2	157.2	11.3	3.0	-35.2
42	MTL.MACH-POWER TLS	90.2	1.7	1.0	0.7	0.3	2.7	3.3	1.7	1.3	-1.0	-2.3	-1.0	-1.0
43	GEN. MACH,SHOP PRD	660.7	120.4	117.4	74.0	19.6	99.2	137.0	88.9	65.3	21.2	-19.6	-14.9	-45.8
44	COMPUTERS, ETC.	183.8	83.9	12.6	3.0	-19.2	9.0	11.6	7.0	5.6	75.0	1.0	-4.0	-24.9
45	SERVICE IND. MACH.	348.3	19.9	21.6	7.0	0.3	12.9	18.2	9.3	7.6	7.0	3.3	-2.3	-7.3

TABLE 5: SECTION 232 INVESTIGATION INTO MACHINE TOOLS
CHANGES IN STOCKS OF METAL FORMING MACHINE TOOLS
TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION
ESTIMATES ARE BASED ON MAXIMUM 20% SURGE IN 1980 CAPACITY LEVELS
(MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION					PRODUCTION-CIVILIAN ECONOMY				
		INITIAL	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS					CHANGES-MACHINE TOOL STOCKS				
		STOCK*	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3		MOB YR	YEAR 1	YEAR 2	YEAR 3	
1	AGRICULTURE	264.7	94.2	-4.0	3.6	-3.3	2.7	4.6	2.7	2.0		91.5	-8.6	1.0	-5.3	
2	IRN&FRRALLYS MIN.	1.0	43.8	8.6	-0.3	-0.7	6.3	8.3	4.6	3.3		37.5	0.3	-5.0	.0	
3	NFRRS MTL ORES MIN	3.3	2.3	1.7	0.7	0.3	1.0	1.7	1.0	0.7		1.3	0.0	-0.3	-.3	
4	COAL MINING	15.3	2.3	1.0	0.7	0.3	1.0	1.3	1.0	0.7		1.3	-0.3	-0.3	-0.3	
5	CRUDE PET & NAT GA	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.7	0.0	0.0	0.0	
6	STONE,CLAY MIN,ETC	5.0	1.7	0.3	0.0	0.0	0.3	0.7	0.3	0.3		1.3	-0.3	-0.3	-0.3	
7	CHM,FRTLZR MINRALS	2.7	1.0	0.7	0.3	0.0	0.3	0.7	0.3	0.3		0.7	0.0	-0.3	-0.3	
8	CONSTRUCTION	146.3	5.3	2.0	1.7	0.7	3.0	6.0	3.6	3.0		2.3	-4.0	-2.0	-2.3	
9	ORDNANCE & ACCESS.	233.5	59.7	442.5	290.2	169.5	46.1	443.2	287.9	171.2		13.6	-0.7	2.3	-1.7	
10	FOOD,KINDRED PRD.	95.5	3.6	0.0	0.3	-0.3	0.7	1.0	0.3	0.3		3.0	-1.0	0.0	-0.7	
11	TOBACCO MFRS.	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
12	FABRCS,YARN,THREAD	21.6	2.3	0.0	0.0	0.0	0.3	0.7	0.3	0.3		2.0	-0.7	-0.3	-0.3	
13	MSC TXTLS,FLR COV	6.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	-0.3	0.0	0.0	
14	APPAREL	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
15	OTH MSC TXTL PRD	6.6	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3		2.0	-0.7	-0.3	-0.3	
16	LUMBER,WOOD PRD.	128.4	7.0	4.6	2.7	1.3	5.0	7.0	4.0	3.0		-0.3	-0.3	0.0	0.0	
17	WOODEN CONTAINERS	2.0	0.3	0.7	0.3	0.3	0.3	0.7	0.3	0.3		2.0	-2.3	-0.3	-0.3	
18	FURNTR & FIXTRS	365.5	8.6	9.3	3.6	3.0	8.6	11.6	5.0	4.6		0.0	0.0	-0.3	-1.7	
19	PAPER,ALLIED PRD.	83.6	8.3	4.0	3.0	1.0	3.6	6.0	3.6	3.0		0.0	-2.3	-1.3	0.0	
20	PPRBRD CNTNRS,BOXE	37.5	3.0	1.7	1.0	0.3	1.7	2.7	1.3	1.0		4.6	-2.0	-0.7	-1.7	
21	PRINTING,PUBLISHIN	46.1	6.6	3.0	2.7	1.3	2.7	4.3	2.7	2.0		1.3	-1.0	-0.3	-0.7	
22	CHEM. & ALLIED PRD	147.6	41.5	39.8	25.2	12.3	23.2	45.4	32.5	19.6		4.0	-1.3	0.0	-0.7	
23	PLASTICS,SYN.MTRLS	16.6	4.0	1.3	0.7	0.3	1.3	2.0	1.0	1.0		18.2	-5.6	-7.3	-7.3	
24	DRUGS,CLEANNG,ETC.	19.9	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0		2.7	-0.7	-0.3	-0	
25	PAINTS,ALLIED PRD.	2.3	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0		0.3	-0.3	0.0	(	
26	PETRO. REFINING	56.1	6.3	4.0	2.7	1.3	3.0	5.3	3.6	2.7		0.3	-0.3	0.0	0.0	
27	RUBBER,MSC.PLSTCS	224.9	17.9	12.3	7.3	2.7	12.6	19.6	10.9	9.0		3.3	-1.3	-1.0	-1.3	
28	LEATHER TANNING	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		5.3	-7.3	-3.6	-6.3	
29	FOOTWEAR,OTH. PRD.	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
30	GLASS & PRODUCTS	38.5	3.0	2.0	1.0	0.3	2.0	2.7	1.3	1.3		0.0	0.0	0.0	0.0	
31	STONE & CLAY PRD.	83.6	5.0	3.3	1.7	0.7	3.0	4.6	3.0	2.3		1.0	-0.7	-0.3	-1.0	
32	PRIM. IRON&STEEL	1207.1	935.1	308.1	125.4	52.4	262.4	336.7	191.4	139.0	672.7	2.0	-1.3	-1.3	-1.7	
33	PRIM. NFRRS MTLS.	464.0	220.2	196.0	85.9	47.4	126.4	197.4	120.1	87.6	93.9	-28.5	-66.0	-86.6		
34	FBRCTD. MTL. PRD.	7265.6	570.5	487.9	269.7	144.0	532.4	747.7	422.6	328.1	38.1	-1.3	-34.2	-40.1		
35	ENGINES&TURBINES	46.1	4.0	3.3	1.7	0.7	5.6	5.6	3.3	2.3	-1.7	-259.7	-152.9	-184.1		
36	FARM MACH.,EQUIP.	365.5	7.6	0.7	1.0	0.3	2.0	3.6	1.7	1.7	5.6	-2.3	-1.7	-1.7		
37	CNSTCTN,MIN,OIL EQ	346.6	34.2	16.6	5.6	-24.2	13.3	19.2	9.6	7.3	20.9	-3.0	-0.7	-1.3		
38	MTRL HNDLNG,SP.IND	185.1	4.3	3.0	1.7	0.7	6.3	9.3	5.6	3.6	-2.0	-2.7	-4.0	-31.5		
39	MACH.TOOLS-CUTTING	137.7	31.8	17.2	6.0	-13.3	7.0	9.0	5.0	3.6	24.9	-6.3	-4.0	-3.0		
40	MACH.TOOLS-FORMING	58.0	31.8	7.0	3.0	-6.6	3.3	4.0	2.0	1.7	28.5	8.3	1.0	-16.9		
41	SP.DIES,TOOLS,ETC.	317.1	167.2	75.3	45.8	-3.0	42.1	65.7	41.5	30.2	125.1	3.0	1.0	-8.3		
42	MTL.MACH-POWER TLS	108.5	1.7	1.0	0.7	0.3	2.7	3.3	1.7	1.3	-1.0	9.6	4.3	-33.2		
43	GEN. MACH,SHOP PRD	792.8	110.8	102.5	65.0	35.2	99.2	137.0	88.9	65.3	11.6	-2.3	-1.0	-1.0		
44	COMPUTERS, ETC.	220.2	47.4	12.6	3.0	-19.2	9.0	11.6	7.0	5.6	38.5	-34.5	-23.9	-30.2		
45	SERVICE IND. MACH.	417.9	19.9	16.9	8.6	5.3	12.9	18.2	9.3	7.6	7.0	1.0	-4.0	-24.9		
												-1.3	-0.7	-2.3		

SECTION 232 INVESTIGATION INTO MACHINE TOOLS
TABLE 5: CHANGES IN STOCKS OF METAL FORMING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION
ESTIMATES ARE BASED ON MAXIMUM 20% SURGE IN 1980 CAPACITY LEVELS
(MILLIONS $1983)

		TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
SEQ	INDUSTRY NAME	STOCK*	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
46	ELEC. TRNSMSSN EQ.	866.7	155.6	147.9	68.0	-5.3	118.7	142.6	81.6	63.0	36.8	5.3	-13.6	-68.3
47	OTH ELEC. EQ.	1857.5	304.5	360.9	162.9	107.8	347.0	497.9	240.8	203.0	-42.5	-137.0	-77.9	-95.2
48	COMMUNICATION EQ.	786.8	671.4	799.1	276.0	237.2	549.6	807.0	348.0	305.8	121.7	-8.0	-72.0	-68.7
49	MOTOR VEHICLES	1186.5	25.9	25.2	11.9	8.3	30.2	69.3	24.5	24.9	-4.3	-44.1	-12.6	-16.6
50	AIRCRAFT	360.9	223.2	441.5	370.5	277.3	245.8	431.5	379.8	301.5	-22.6	10.0	-9.3	-24.2
51	SHIPS & BOATS	105.1	110.8	112.8	58.4	34.2	146.3	111.1	57.1	37.5	-35.5	1.7	1.3	-3.3
52	RAILROAD EQUIP.	64.0	4.6	3.3	3.0	-5.0	1.0	1.7	1.0	0.7	3.6	1.7	2.0	-5.6
53	OTHR. TRNSPTTN EQ.	24.9	4.3	0.0	-3.6	0.0	0.3	1.0	0.3	0.3	4.0	-1.0	-4.0	-0.3
54	INSTRMNTS,OPTCL GD	548.0	80.9	69.0	57.4	-22.2	63.7	92.9	60.7	45.1	17.2	-23.9	-3.3	-67.3
55	MISC. MFG.	831.9	23.9	10.9	10.0	3.3	16.9	24.9	16.3	11.6	7.0	-13.9	-6.3	-8.3
56	TRANSPORTATION	228.9	54.4	52.7	38.1	18.6	32.5	63.0	43.5	28.5	21.9	-10.3	-5.3	-10.0
57	COMMUNICATIONS	5.3	1.3	0.3	0.3	0.0	0.3	0.7	0.3	0.3	1.0	-0.3	0.0	-0.3
58	RADIO,TV BRDCSTNG	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
59	PUBLIC UTILITIES	139.0	17.6	9.3	6.0	2.3	8.0	12.3	8.3	6.0	9.6	-3.0	-2.3	-3.6
60	TRADE	179.4	31.8	0.7	0.0	-4.3	6.0	9.6	6.0	4.6	25.9	-9.0	-6.0	-9.0
61	FINANCE,INSURNCE	8.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.3
62	REAL ESTATE,RENTLS	4.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
63	HOTELS,PERS REPRS	93.2	11.9	9.0	11.3	5.3	8.3	13.9	9.0	6.3	3.6	-5.0	2.3	-1.0
64	BUSNESS SRVCS,R&D	127.7	38.5	18.2	14.6	7.3	15.6	23.2	15.6	11.3	22.9	-5.0	-1.0	-4.0
65	AUTO REPAIRS	179.4	45.8	46.4	21.6	15.6	6.3	10.6	7.0	5.0	39.5	35.8	14.6	10.6
66	AMUSEMENTS	24.2	3.6	-2.0	0.3	0.3	0.7	1.0	0.7	0.7	3.0	-3.0	-0.3	-0.3
67	MED,EDUC,NONPROFIT	38.8	4.0	-3.3	2.0	-1.7	0.3	0.3	0.3	0.3	3.6	-3.6	1.7	-2.0
68	MISC. ECON. SECTOR	3434.1	113.8	71.6	45.4	19.2	103.2	234.8	310.8	203.0	10.6	-163.2	-265.4	-183.8
STOCKS AND NET CHANGES		25106.7	4444.8	3960.8	2126.2	1109.9	2954.8	4699.2	2893.8	2176.6	1490.0	-738.4	-767.6	-1066.7

*NOTE:- THE ENTRIES FOR MANUFACTURING INDUSTRIES IN THE COLUMN LABELLED "INITIAL STOCK" HAVE BEEN INCREASED BY A MAXIMUM OF 20% OVER THE SAME ENTRIES IN TABLE 4 IF THE INDUSTRY OPERATES FOR 140 HOURS A WEEK OR LESS

SECTION 232 INVESTIGATION INTO MACHINE TOOLS

TABLE 6: CHANGES IN STOCKS OF METAL FORMING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON MAXIMUM 40% SURGE IN 1980 CAPACITY LEVELS (MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK *	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
1	AGRICULTURE	264.7	140.6	-4.0	3.6	-3.3	2.7	4.6	2.7	2.0	138.0	-8.6	1.0	-5.3
2	IRN&FRRALLYS MIN.	1.0	50.4	8.3	-0.3	-0.7	6.3	8.3	4.6	3.3	44.1	0.0	-5.0	-4.0
3	NFRRS MTL ORES MIN	3.3	3.0	1.7	0.7	0.3	1.0	1.7	1.0	0.7	2.0	0.0	-0.3	-0.3
4	COAL MINING	15.3	3.0	1.0	0.7	0.3	1.0	1.3	1.0	0.7	2.0	-0.3	-0.3	-0.3
5	CRUDE PET & NAT GA	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
6	STONE,CLAY MIN,ETC	5.0	2.3	0.3	0.0	0.0	0.3	0.7	0.3	0.3	2.0	-0.3	-0.3	-0
7	CHM,FRTLZR MINRALS	2.7	1.3	0.7	0.3	0.0	0.3	0.7	0.7	0.3	1.0	0.0	-0.3	-0
8	CONSTRUCTION	146.3	6.3	2.0	1.7	0.7	3.0	6.0	3.6	3.0	3.3	-4.0	-2.0	-2.3
9	ORDNANCE & ACCESS.	272.3	20.9	442.5	290.2	169.5	16.3	443.2	287.9	171.2	4.6	-0.7	2.3	-1.7
10	FOOD,KINDRED PRD.	111.5	5.0	0.0	0.3	-0.3	0.7	1.0	0.3	0.3	4.3	-1.0	0.0	-0.7
11	TOBACCO MFRS.	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	FABRCS,YARN,THREAD	25.2	2.3	0.0	0.0	0.0	0.3	0.7	0.3	0.3	2.0	-0.7	-0.3	-0.3
13	MSC TXTLS,FLR COV	7.6	0.3	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	-0.3	0.0	0.0
14	APPAREL	16.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	OTH MSC TXTL PRD	7.6	0.3	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	-0.3	-0.3	-0.3
16	LUMBER,WOOD PRD.	149.6	7.6	4.6	2.7	1.3	5.0	7.0	4.0	3.0	2.7	-2.3	-1.3	-1.7
17	WOODEN CONTAINERS	2.3	0.3	0.7	0.3	0.3	0.3	0.7	0.7	0.3	0.0	0.0	-0.3	0.0
18	FURNTR & FIXTRS	426.6	7.3	9.3	4.0	3.0	8.6	11.6	5.0	4.6	-1.3	-2.3	-1.0	-1.7
19	PAPER,ALLIED PRD.	88.2	12.3	5.0	1.3	-0.3	3.6	6.0	3.6	3.0	8.6	-1.0	-2.3	-3.3
20	PPRBRD CNTNRS,BOXE	43.8	3.6	1.7	1.0	0.3	1.7	2.7	1.3	1.0	2.0	-1.0	-0.3	-0.7
21	PRINTING,PUBLISHIN	53.7	8.0	3.0	2.7	1.3	2.7	4.3	2.7	2.0	5.3	-1.3	0.0	-0.7
22	CHEM. & ALLIED PRD	152.3	56.1	39.8	25.2	12.3	23.2	45.4	32.5	19.6	32.8	-5.6	-7.3	-7.3
23	PLASTICS,SYN.MTRLS	16.6	7.0	1.3	0.7	0.3	1.3	2.0	1.0	1.0	5.6	-0.7	-0.3	-0.7
24	DRUGS,CLEANNG,ETC.	23.2	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	-0.3	0.0	0.0
25	PAINTS,ALLIED PRD.	2.7	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3	-0.3	0.0	0.0
26	PETRO. REFINING	56.1	8.3	4.0	2.7	1.3	3.0	5.3	3.6	2.7	5.3	-1.3	-1.0	-1.3
27	RUBBER,MSC.PLSTCS	262.4	18.9	11.9	7.6	2.7	12.6	19.6	10.9	9.0	6.3	-7.6	-3.3	-6.
28	LEATHER TANNING	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
29	FOOTWEAR,OTH. PRD.	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	GLASS & PRODUCTS	38.5	4.6	1.7	0.0	0.7	2.0	2.7	1.3	1.3	2.7	-1.0	-1.3	-0.7
31	STONE & CLAY PRD.	97.5	5.6	3.0	1.7	1.0	3.0	4.6	3.0	2.3	2.7	-1.7	-1.3	-1.3
32	PRIM. IRON&STEEL	1207.1	1211.0	298.5	127.7	62.4	262.4	336.7	191.4	139.0	948.7	-38.1	-63.7	-76.6
33	PRIM. NFRRS MTLS.	464.0	291.2	192.1	86.9	48.4	126.4	197.4	120.1	87.6	164.9	-5.3	-33.2	-39.1
34	FBRCTD. MTL. PRD.	8476.6	564.2	475.7	281.9	150.9	532.4	747.7	422.6	328.1	31.8	-272.0	-140.6	-177.1
35	ENGINES&TURBINES	53.7	4.0	3.3	1.7	1.0	5.6	5.6	3.3	2.3	-1.7	-2.3	-1.7	-1.3
36	FARM MACH.,EQUIP.	427.6	10.6	0.7	1.0	0.3	2.0	3.6	1.7	1.7	8.6	-3.0	-0.7	-1.3
37	CNSTCTN,MIN,OIL EQ	404.3	14.3	4.3	2.0	1.0	13.3	19.2	9.6	7.3	1.0	-14.9	-7.6	-6.3
38	MTRL HNDLNG,SP.IND	215.9	5.6	3.0	1.7	0.7	6.3	9.3	5.6	3.6	-0.7	-6.3	-4.0	-3.0
39	MACH.TOOLS-CUTTING	160.5	11.3	17.2	6.0	-13.3	7.0	9.0	5.0	3.6	4.3	8.3	1.0	-16.9
40	MACH.TOOLS-FORMING	68.0	23.6	6.6	3.0	-6.6	3.3	4.0	2.0	1.7	20.2	2.7	1.0	-8.3
41	SP.DIES,TOOLS,ETC.	370.2	139.0	74.0	45.8	-2.0	42.1	65.7	41.5	30.2	96.9	8.3	4.3	-32.2
42	MTL.MACH-POWER TLS	126.4	2.0	1.0	0.7	0.3	2.7	3.3	1.7	1.3	-0.7	-2.3	-1.0	-1.0
43	GEN. MACH,SHOP PRD	925.1	110.8	99.5	65.3	39.1	99.2	137.0	88.9	65.3	11.6	-37.5	-23.6	-26.2
44	COMPUTERS, ETC.	257.1	10.9	12.6	3.0	-19.2	9.0	11.6	7.0	5.6	2.0	1.0	-4.0	-24.9
45	SERVICE IND. MACH.	487.9	22.6	16.9	8.6	5.3	12.9	18.2	9.3	7.6	9.6	-1.3	-0.7	-2.3

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TABLE 6: CHANGES IN STOCKS OF METAL FORMING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON MAXIMUM 40% SURGE IN 1980 CAPACITY LEVELS (MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK*	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
46	ELEC. TRNSMSSN EQ.	1049.5	81.3	84.6	67.7	-1.3	118.7	142.6	81.6	63.0	-37.5	-58.0	-13.9	-66.3
47	OTH ELEC. EQ.	2167.0	234.8	354.9	166.5	108.1	347.0	497.9	240.8	203.0	-112.1	-143.0	-74.3	-94.9
48	COMMUNICATION EQ.	918.1	544.0	799.1	276.0	237.2	549.6	807.0	348.0	305.8	-5.6	-8.0	-72.0	-68.7
49	MOTOR VEHICLES	1384.2	29.2	24.9	12.3	8.3	30.2	69.3	24.5	24.9	-1.0	-44.4	-12.3	-16.6
50	AIRCRAFT	421.3	163.9	441.5	370.5	277.3	245.8	431.5	379.8	301.5	-81.9	10.0	-9.3	-24.2
51	SHIPS & BOATS	105.1	111.5	112.8	58.4	34.2	146.3	111.1	57.1	37.5	-34.8	1.7	1.3	-3.3
52	RAILROAD EQUIP.	74.6	2.0	1.3	1.0	0.3	1.0	1.7	1.0	0.7	1.0	-0.3	0.0	-0.3
53	OTHR. TRNSPTTN EQ.	28.9	0.3	0.0	0.0	0.0	0.3	1.0	0.3	0.3	0.0	-1.0	-0.3	-0.3
54	INSTRMNTS,OPTCL GD	639.5	25.2	42.1	57.4	-22.2	63.7	92.9	60.7	45.1	-38.5	-50.8	-3.3	-67.3
55	MISC. MFG.	970.6	27.2	10.6	10.3	3.3	16.9	24.9	16.3	11.6	10.3	-14.3	-6.0	-8.3
56	TRANSPORTATION	228.9	73.0	52.4	38.1	18.9	32.5	63.0	43.5	28.5	40.5	-10.6	-5.3	-9.6
57	COMMUNICATIONS	5.3	1.3	0.3	0.3	0.0	0.3	0.7	0.3	0.3	1.0	-0.3	0.0	-0.3
58	RADIO,TV BRDCSTNG	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
59	PUBLIC UTILITIES	139.0	23.2	7.0	6.0	2.3	8.0	12.3	8.3	6.0	15.3	-5.3	-2.3	-3.6
60	TRADE	179.4	38.1	0.7	0.0	-4.3	6.0	9.6	6.0	4.6	32.2	-9.0	-6.0	-9.0
61	FINANCE,INSURNCE	8.6	0.7	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.3	0.0	0.0	0.3
62	REAL ESTATE,RENTLS	4.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
63	HOTELS,PERS REPRS	93.2	14.3	8.6	11.3	5.3	8.3	13.9	9.0	6.3	6.0	-5.3	2.3	-1.0
64	BUSNESS SRVCS,R&D	127.7	48.8	17.9	14.6	7.6	15.6	23.2	15.6	11.3	33.2	-5.3	-1.0	-3.6
65	AUTO REPAIRS	179.4	52.7	46.1	21.6	15.6	6.3	10.6	7.0	5.0	46.4	35.5	14.6	10.6
66	AMUSEMENTS	24.2	4.0	-2.0	0.3	0.3	0.7	1.0	0.7	0.7	3.3	-3.0	-0.3	-0.3
67	MED,EDUC,NONPROFIT	38.8	4.3	-3.3	2.0	-1.7	0.3	0.3	0.3	0.3	4.0	-3.6	1.7	-2.0
68	MISC. ECON. SECTOR	3434.1	138.3	69.0	45.1	19.6	103.2	234.8	310.8	203.0	35.2	-165.9	-265.7	-183.4
STOCKS AND NET CHANGES		28170.6	4416.6	3812.6	2141.8	1166.3	2924.9	4699.2	2893.8	2176.6	1491.7	-886.6	-752.0	-1010.4

*NOTE:- THE ENTRIES FOR MANUFACTURING INDUSTRIES IN THE COLUMN LABELLED "INITIAL STOCK" HAVE BEEN INCREASED BY A MAXIMUM 40% OVER THE SAME ENTRIES IN TABLE 4 IF THE INDUSTRY OPERATES FOR 120 HOURS A WEEK OR LESS

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TABLE 7: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON NO SURGE IN 1980 CAPACITY LEVELS EXPERIMENT BASED ON ZERO LEVEL OF PERSONAL CONSUMPTION EXPENDITURES (MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
46	ELEC. TRNSMSSN EQ.	1274.4	415.9	263.3	120.2	-12.9	209.5	252.0	143.8	111.4	206.4	11.3	-23.6	-124.
47	OTH ELEC. EQ.	2435.9	426.0	578.2	281.3	173.0	545.8	783.7	378.8	319.6	-119.9	-205.4	-97.5	-146.
48	COMMUNICATION EQ.	1023.4	824.9	1311.6	522.2	381.6	857.9	1259.7	543.0	477.6	-33.0	51.9	-20.8	-96.
49	MOTOR VEHICLES	4871.0	23.0	25.8	17.0	10.4	148.5	341.0	121.1	122.7	-125.5	-315.2	-104.1	-112.
50	AIRCRAFT	3947.6	3670.4	5782.7	4855.5	3641.5	3225.9	5663.1	4983.6	3956.1	444.5	119.5	-128.0	-314.
51	SHIPS & BOATS	414.0	430.7	440.1	227.5	134.6	575.4	436.4	228.3	147.2	-144.7	3.8	3.1	-12.
52	RAILROAD EQUIP.	223.1	60.1	10.1	10.7	-20.8	3.5	6.6	4.4	2.8	56.6	3.5	6.3	-23.
53	OTHR. TRNSPTTN EQ.	80.2	0.6	0.6	0.3	0.3	1.9	3.8	1.6	1.3	-1.3	-3.1	-1.3	-0.
54	INSTRMNTS,OPTCL GD	1702.6	343.9	374.4	181.2	1.6	237.2	346.1	225.9	167.7	106.6	28.3	-44.7	-166.
55	MISC. MFG.	615.0	8.5	10.7	6.3	3.5	15.1	22.0	14.5	10.4	-6.6	-11.3	-8.2	-6.
56	TRANSPORTATION	610.6	41.5	40.9	47.5	47.5	86.8	168.3	115.8	75.8	-45.3	-127.4	-68.3	-28.
57	COMMUNICATIONS	14.2	0.6	0.6	0.3	0.3	0.9	1.6	0.9	0.6	-0.3	-0.9	-0.6	-0.
58	RADIO,TV BRDCSTNG	2.2	0.3	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	-0.
59	PUBLIC UTILITIES	365.6	26.4	25.5	14.2	7.9	21.1	32.4	21.4	15.7	5.3	-6.9	-7.2	-7.
60	TRADE	478.5	14.8	17.0	10.4	5.7	16.0	26.1	16.4	12.3	-1.3	-9.1	-6.0	-6.
61	FINANCE,INSURNCE	23.0	0.6	0.6	0.3	0.3	0.6	0.9	0.6	0.3	0.0	-0.3	-0.3	0.
62	REAL ESTATE,RENTLS	11.0	0.3	0.3	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0	-0.3	0.
63	HOTELS,PERS REPRS	248.2	9.1	12.3	7.2	4.7	22.0	37.1	23.6	16.7	-12.9	-24.9	-16.4	-12.
64	BUSNESS SRVCS,R&D	220.5	17.3	33.0	22.3	14.5	26.7	40.3	26.7	19.5	-9.4	-7.2	-4.4	-5.
65	AUTO REPAIRS	459.9	12.9	15.7	10.4	6.9	16.0	27.4	17.6	13.2	-3.1	-11.6	-7.2	-6.
66	AMUSEMENTS	64.2	0.9	1.6	0.9	0.6	1.6	2.2	1.6	1.6	-0.6	-0.6	-0.6	-0.
67	MED,EDUC,NONPROFIT	103.2	0.3	0.3	0.3	0.0	1.3	0.9	0.6	0.6	-0.9	-0.6	-0.3	-0.
68	MISC. ECON. SECTOR	5724.8	104.8	116.1	65.1	35.9	172.1	391.4	518.1	338.2	-67.3	-275.3	-453.0	-302.
STOCKS AND NET CHANGES		54187.3	12798.6	14089.7	9242.9	4957.2	9399.0	15369.8	10781.7	8196.9	3399.6	-1280.1	-1538.7	-3239.8

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TABLE 7: CHANGES IN STOCKS OF METAL CUTTING MACHINE TOOLS TO MEET TOTAL U.S. PRODUCTION GOALS DURING A CONVENTIONAL MOBILIZATION ESTIMATES ARE BASED ON NO SURGE IN 1980 CAPACITY LEVELS EXPERIMENT BASED ON ZERO LEVEL OF PERSONAL CONSUMPTION EXPENDITURES (MILLIONS $1983)

SEQ	INDUSTRY NAME	TOTAL U.S. PRODUCTION					DEFENSE PRODUCTION				PRODUCTION-CIVILIAN ECONOMY			
		INITIAL STOCK	CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS				CHANGES-MACHINE TOOL STOCKS			
			MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3	MOB YR	YEAR 1	YEAR 2	YEAR 3
1	AGRICULTURE	705.6	30.2	-1.6	8.8	-1.3	7.6	12.0	6.9	5.7	22.7	-13.5	1.9	-6.9
2	IRN&FRRALLYS MIN.	2.8	97.2	23.0	-0.9	-2.5	17.0	22.0	12.6	9.1	80.2	0.9	-13.5	-11.6
3	NFRRS NTL ORES MIN	9.1	4.1	4.4	1.6	0.3	2.5	4.1	2.5	1.9	1.6	0.3	-0.9	-1.6
4	COAL MINING	40.9	3.8	2.8	1.6	0.6	2.5	3.8	2.2	1.9	1.3	-0.9	-0.6	-1.3
5	CRUDE PET & NAT GA	1.3	0.9	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.9	-0.3	-0.3	0.0
6	STONE,CLAY MIN,ETC	13.2	2.2	0.6	0.0	0.3	0.9	1.6	0.9	0.6	1.3	-0.9	-0.9	-0.3
7	CHM,FRTLZR MINRALS	6.9	1.6	1.6	0.9	0.6	0.9	1.9	1.3	0.9	0.6	-0.3	-0.3	-0.
8	CONSTRUCTION	389.8	7.2	5.0	3.1	1.9	7.9	16.0	9.8	8.5	-0.6	-11.0	-6.6	-6.
9	ORDNANCE & ACCESS.	591.4	283.8	1352.5	879.0	522.9	258.9	1347.1	874.9	520.0	24.9	5.3	4.1	2.8
10	FOOD,KINDRED PRD.	212.0	1.6	1.3	0.9	0.6	1.6	2.5	1.3	0.9	0.0	-1.3	-0.3	-0.3
11	TOBACCO MFRS.	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	FABRCS,YARN,THREAD	47.8	3.1	0.6	-0.3	0.0	1.3	1.9	0.9	0.9	1.9	-1.3	-1.3	-0.9
13	MSC TXTLS,FLR COV	12.6	0.3	0.3	0.3	0.0	0.6	0.6	0.3	0.3	-0.3	-0.3	0.0	-0.3
14	APPAREL	30.2	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	-0.3	-0.3	-0.3	-0.3
15	OTH MSC TXTL PRD	11.0	0.0	0.3	0.3	0.0	0.6	0.9	0.3	0.3	-0.3	-0.3	-0.3	-0.3
16	LUMBER,WOOD PRD.	274.6	11.0	12.0	6.6	3.5	12.6	17.9	10.7	8.2	-1.6	-6.0	-4.1	-4.7
17	WOODEN CONTAINERS	4.4	0.9	1.9	1.3	0.6	0.9	1.9	1.3	0.9	0.0	0.0	0.0	-0.3
18	FURNTR & FIXTRS	229.0	5.0	7.2	3.1	2.2	6.6	8.8	3.8	3.5	-1.6	-1.6	-0.6	-1.3
19	PAPER,ALLIED PRD.	169.9	8.2	10.7	6.3	3.5	9.1	14.5	9.1	6.9	-0.9	-3.8	-2.8	-3.5
20	PPRBRD CNTNRS,BOXE	67.0	3.5	4.1	2.2	1.3	3.5	5.7	3.1	2.5	0.0	-1.6	-0.9	-1.3
21	PRINTING,PUBLISHIN	58.5	2.8	5.0	3.5	2.2	4.4	6.6	4.4	3.1	-1.6	-1.6	-0.9	-0.9
22	CHEM. & ALLIED PRD	307.4	91.5	101.0	61.3	32.7	58.2	113.3	81.2	48.8	33.3	-12.3	-19.8	-16.0
23	PLASTICS,SYN.MTRLS	40.6	4.4	3.5	1.3	0.9	3.5	5.0	2.8	2.2	0.9	-1.6	-1.6	-1.3
24	DRUGS,CLEANNG,ETC.	40.6	0.0	0.0	0.0	0.0	0.3	0.6	0.0	0.3	-0.3	-0.6	0.0	-0.3
25	PAINTS,ALLIED PRD.	4.1	0.3	0.3	0.3	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	-0.3
26	PETRO. REFINING	125.2	8.8	9.1	6.0	3.5	8.2	14.2	10.1	7.2	0.6	-5.0	-4.1	-3.8
27	RUBBER,MSC.PLSTCS	441.4	25.8	28.3	15.7	7.2	29.6	46.2	25.8	20.8	-3.8	-17.9	-10.1	-13.5
28	LEATHER TANNING	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	FOOTWEAR,OTH. PRD.	10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	GLASS & PRODUCTS	84.6	4.4	5.0	2.5	1.6	5.0	6.6	3.5	2.8	-0.6	-1.6	-0.9	-1.3
31	STONE & CLAY PRD.	184.7	8.8	7.6	4.1	2.2	7.9	12.6	7.6	6.0	0.9	-5.0	-3.5	-3.8
32	PRIM. IRON&STEEL	1990.5	1042.6	502.7	207.6	72.4	432.6	555.6	315.9	229.3	610.0	-52.9	-108.2	-157.0
33	PRIM. NFRRS MTLS.	838.4	234.1	358.3	158.6	85.3	228.1	356.4	217.1	158.2	6.0	1.9	-58.5	-73.0
34	FBRCTD. NTL. PRD.	6196.0	438.6	475.7	271.8	140.6	544.6	765.1	432.3	335.7	-106.0	-289.4	-160.4	-195.1
35	ENGINES&TURBINES	459.9	45.3	52.9	26.4	0.0	69.2	69.5	38.1	28.9	-23.9	-16.7	-11.6	-28.9
36	FARM MACH.,EQUIP.	1012.4	4.1	3.1	2.8	1.3	6.3	12.0	5.7	5.0	-2.2	-8.8	-2.8	-3.8
37	CNSTCTN,MIN,OIL EQ	1742.9	528.8	99.7	33.0	-145.0	79.0	115.1	57.9	44.0	449.9	-15.4	-24.9	-189.1
38	MTRL HNDLNG,SP.IND	1902.1	116.7	152.6	37.1	-147.9	76.8	112.6	68.9	45.9	40.0	40.0	-31.8	-193.8
39	MACH.TOOLS-CUTTING	997.0	445.2	152.3	56.0	-115.8	60.4	78.7	41.8	33.0	384.8	73.6	14.2	-148.8
40	MACH.TOOLS-FORMING	413.4	341.0	57.9	24.9	-57.3	28.0	33.7	17.3	13.2	313.0	24.2	7.6	-70.5
41	SP.DIES,TOOLS,ETC.	1948.3	1412.6	559.0	339.5	-28.6	309.3	483.5	305.5	223.1	1103.3	75.5	34.0	-251.7
42	MTL.MACH-POWER TLS	772.3	11.3	9.1	5.7	3.1	22.0	28.0	14.8	11.3	-10.7	-18.9	-9.1	-8.2
43	GEN. MACH,SHOP PRD	5689.9	884.3	964.9	649.3	177.7	852.0	1179.1	765.7	561.9	31.5	-214.2	-116.4	-384.1
44	COMPUTERS, ETC.	538.9	235.0	39.0	11.3	-55.4	26.4	34.0	20.1	16.4	208.6	5.0	-8.8	-71.7
45	SERVICE IND. MACH.	645.2	13.5	14.2	7.9	4.7	24.2	33.7	17.6	14.2	-10.7	-19.5	-9.8	-9.4